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Protection of Street Mains by an Adequate System of Inspection.[1]

[Prepared for Eighth Meeting, American Gas Institute, by MR. C. C. SIMPSON, JR.]

Introduction.—Assuming at the outset that gas property, particularly mains and services, requires protection, and it is scarcely possible that anyone will dispute that the important points for distribution engineers are the methods and devices to be employed to insure that such protection is intelligently obtained. As the writer is more familiar with conditions in New York city, and as its problem is unquestionably as difficult as that of any other American city, it probably will be best to describe our method of handling this question, and then take up the manner of solving it in other cities.

It has been impossible to obtain the views of every distribution engineer on the various divisions of the subject, but I hope that those whose practice is mentioned herein and those who have matters of importance to contribute will enter the discussion.

Street Patrolling or Line-Walking.—For a number of years it has been the practice in the borough of Manhattan to patrol and inspect each street daily. This requires a force of 30 patrolmen and 3 chief patrolmen, and each patrolman is assigned to a district with route laid out for covering it. They start at one end, at 7 A.M., and finish up at about 4 P.M., allowing time to go to the branch office and make a report. Their principal duty is to report leaks, which, of course, are telephoned immediately to the nearest emergency station, and the emergency crew is sent to investigate. The patrolman is required to report to the branch office every item of interest or value to the Company. Before assignment to patrol duty each man receives training and instruction in order that he may be qualified for his duties, and he carries a doctor's certificate to the effect that he is able readily to distinguish the odor of illuminating gas. From January 1st, to December 31st, 1912, these 30-odd patrolmen reported 7,590 important items, including broken mains, leaking joints, services, lamps and drips; condensation spilled in streets; buildings being torn down, requiring the cutting off of services and the removal of meters; mains requiring protection or caulking on account of other companies' street openings; pickholes in mains and services, caused by other companies' work; settlement of street surface, indicating possibility of damage to sub-surface property; box covers missing, reversed, below or above grade, etc. This patrol system costs considerable money, but it is not difficult to demonstrate that it is wisely expended. Each of these 7,590 reports represents approximately a cost of $3; but is it not worth this to be able to properly protect our property before damage results? Analyzing the work of the patrolmen, street leaks of all characters reported number 642. It is difficult to imagine any distribution man questioning the importance of locating leaks with promptness, or disputing that it is worth many times $3 to receive early notification of them. Second in importance, we have 166 reports of depressions in pavements, which, in New York, always indicate the possibility of serious disturbance of mains and services. As evidence of the necessity of having such conditions promptly reported, see 2 cases in which such reports were *not* made. In the first (Figs. 1 and 2) a 36-inch water main developed a leak

Fig. 1.

which washed out a large cavity under the frozen street surface, completely destroying all adjacent sub-surface structures. Under average winter conditions, and certainly at any other time, the patrolman would have discovered this from surface indications and reported it to the emergency crew, and within ½ hour our mains would have been secured or temporarily cut out, and the Water Department notified to take care of theirs. Unfortunately the frozen

1. Slightly abridged.—EDS.

Fig. 2.

ground was of sufficient strength to bear the traffic and the patrolman got no indication of the trouble.

Figs. 3 and 4 show another case the same winter. The photo-

Fig. 3.

Fig 4.

graphs show damage enough, but not the whole story, as the explosions (the first indication of trouble) can only be described not depicted. Here, again, the patrolman was not responsible, as a 3 foot crust of frozen earth held up the surface, while our mains were washed out. These illustrate what could have happened in the other 164 cases had those not been promptly reported.

Another important duty of the patrolman is to report buildings about to be torn down. No one will dispute that it is worth $3 to receive prompt information, that we may enter these buildings before the wreckers destroy the meters and break off the services. 806 reports of this character were turned in.

Another important duty is the reporting of excavations made by other companies, in which it may be necessary to protect our structures. Of course, we can institute legal proceedings if our property is damaged, but it is more economical to prevent trouble and keep clear of the courts. And it is quite possible that, as a result of damage to our mains, someone may be killed. Though the damage may have been caused by others, are we not morally liable for having permitted the accident, knowing that it would have cost but $3 to have information sufficiently in advance to prevent the disaster?

Fig. 5 is a good illustration of what the average contractor consid-

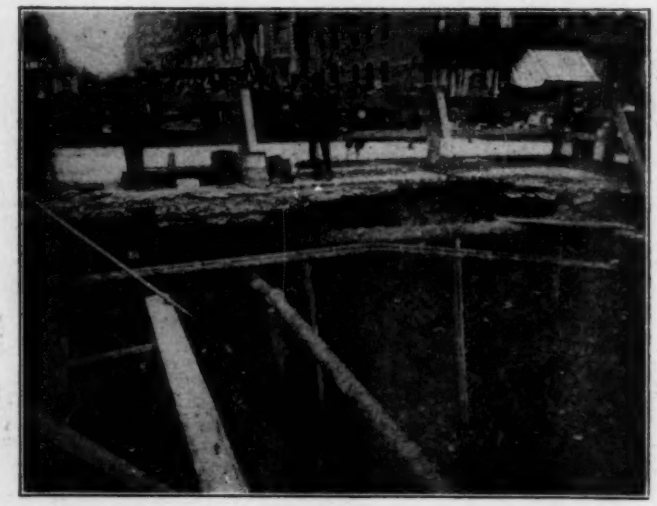

Fig. 5.

ers proper and safe supporting of gas mains—10 or 15 feet of scantling, stuck in the ground, which a slight jar or vibration will shake out of place! Reports to the number of 5,800 of this character were turned in. The other 176 reports consisted of miscellaneous items, such as drip and valve boxes above or below grade; and meter and housepipe leaks, reported to the patrolmen by citizens, etc.

The patrolmen soon become known to the residents of their districts, and also to the workmen of other companies. Their presence with these other workmen undoubtedly prevented considerable damage.

As an incentive to diligence, every 6 months a tabulation is made of the reports turned in, and the patrolman having the highest rating for the period receives an increase in pay.

In Brooklyn, the system is practically identical with that in New York, and it will not be necessary to describe it.

The patrol system in Philadelphia is also similar, except that the patrolman inspects a street about twice a week, and the New York and Brooklyn patrolmen walk their routes; in Philadelphia bicycles are used. During cold weather, the Philadelphia patrol force is increased so that all 2, 3 and 4-inch mains are patrolled twice every 24 hours, and all 6-inch and larger once in 2 days. These additional men walk their routes.

The duties of the Philadelphia patrolmen are, in general, to patrol the streets in which are mains or in which new buildings are being erected to gather and report facts of value to the company. During severe cold weather they also patrol at night. The work is checked by a system of reports, covering in detail all inspections, and indicate the time of all stops made; really, a diary of the patrolman's work. As in New York, the discovery of a condition requiring immediate attention is telephoned to the office.

In Philadelphia a consecutive record of street openings made by other companies is kept on cards made out by the patrolman, enabling the Company to trace any damage by other companies. Philadelphia patrolmen inspect all street openings for which their company is responsible, reporting to the office, sufficiently in advance, all locations at which signal lamps or danger flags may be necessary. They also investigate service conditions where the footway is being paved or repaved, in order to allow prompt renewal of all services where necessary. In buildings about to be torn down, they obtain data as to service location, also size and numbers of the meters there.

Another valuable fact gathered from the patrolmens' reports of street openings is the location of gas company's sub-surface property. In New York this is done by draughtsmen detailed to cover all openings; in Philadelphia the information is obtained by the patrolman and turned in on his report.

In Chicago the company requires that all employees, noting the tearing down of a building, shall report it immediately. In addition they furnish house-wrecking companies with postal cards, to advise the company of intention to tear down buildings, and they are periodically requested for this information.

In Boston the company has no force of inspectors for patrolling streets, as it is felt that the districts are sufficiently covered by the men of several departments in performing their daily duties.

In Detroit the systematic patrolling is confined to the high pressure system.

Rapid Transit Subway Work.—Probably the most dangerous work to gas companies now being undertaken is the construction of underground railroads; and in this much has been learned by bitter experience during the past 10 years. The practice where work of this character is being done is so nearly standardized that a description of the methods employed in New York will cover the ground. No other undertaking has caused the distribution department so much anxiety, and serious accident has only been prevented by extreme precaution and vigilance. When this work was commenced it was done mostly by the open-cut method, but the clamor against traffic and business disturbances resulted in the prosecution of the work by the cut-and-cover method, which, for sub-surface gas property, is infinitely more dangerous. The "open-cut" method consists of opening the entire street from the surface and decking over a small portion for vehicular and passenger traffic. While this method may seriously damage gas mains, the danger of explosions is greatly reduced, as the cut is well ventilated. The "cut-and-cover" method consists in removing the street paving and replacing it with a tight, wooden decking, under which the excavation and construction pro gress by tunneling, and a disastrous explosion could occur were a gas main broken, or even to leak for a short time in this beautifully constructed explosive chamber. An instance of the different and ever-present possibilities of serious leaks is shown on Fig. 6 of the

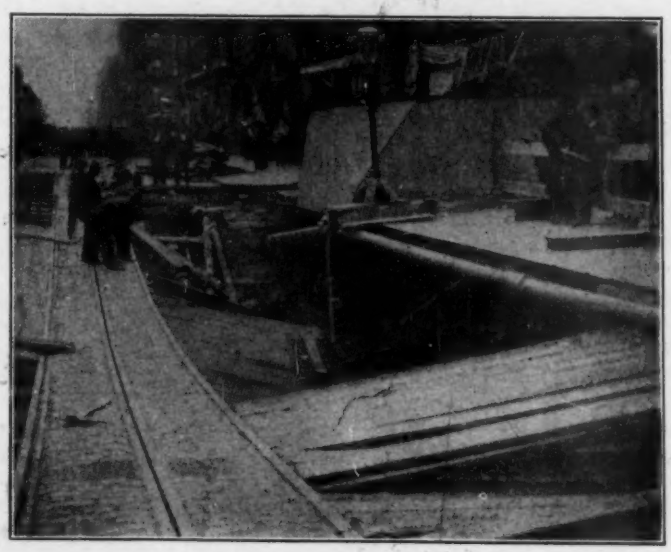

Fig. 6.

damage done by an overcharged blast on New York's Lexington avenue subway, at 87th street. Had our mains not been by-passed on the street surface, over 2,000,000 feet of gas per hour would be emptying into this opening. When the accident took place street traffic was stopped for several days, but not even a slight odor of gas was detected. Why? Because we made it an inviolable rule to kill every underground main on work of this character, and to by-pass it with wrought iron pipe above the decking. In this position temporary mains can be readily inspected and cared for and are subject to the minimum possibility of damage. In the illustration the temporary by-passes are seen, and are absolutely undamaged, not one consumer having been shut off, even for 5 minutes. Contrast these by-passes with the original underground mains seen where the planking has fallen into the cut. This case is typical of the dangers of subway construction, but damage as great could easily be caused by an explosion of gas leaking from a main or service under the decking; and while we have always been convinced that by-passing of that character was necessary, we are indebted to this accident in that it brought vividly to the city officials its absolute necessity. Fig. 7 shows the by-passes along the street decking. These tem-

Fig. 7.

porary mains are laid before any excavating is done, and are carried back in the side streets to a point of safety. As soon as the services are transferred, the mains in the street are cut off and capped. Most of the contractors on subways in New York now consider this protection work so important that they are unwilling to risk excavating until the by-passes are installed.

It is also necessary to take care of all of our larger mains (both distribution and transfer) when interfered with by subway work. Fig. 8 shows the method of carrying large mains on trestles along the

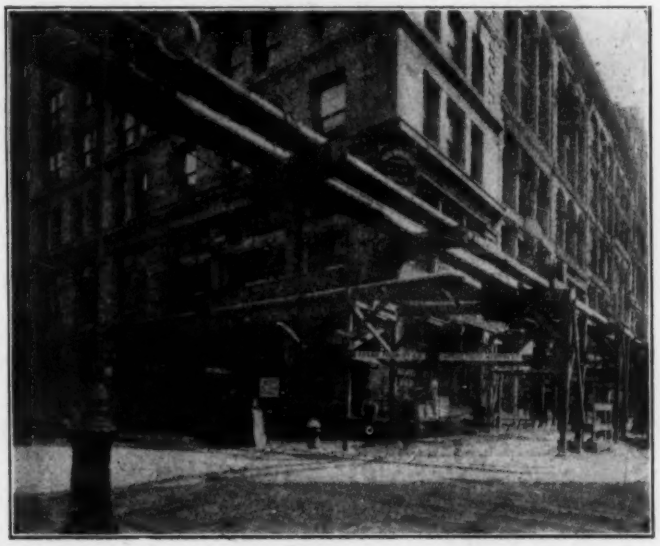

Fig. 8.

route of the Broadway subway. These lines are laid in addition to the regular curb by-passes and are placed overhead so as not to interfere with street traffic.

These precautions are taken before the work is started; but we dare not permit our vigilance to stop here. Every foot of street where subway work is in progress is patrolled, day and night, by specially trained inspectors, each having a section approximately ½ mile long. On each section is a tool-box with the necessary tools, etc., for emergency. The inspectors ring time clocks at each end of their sections at short intervals, are under foreman on each shift and further under the supervision of a general subway inspection foreman. This subway work is deemed so important that the position of subway engineer has been created with one of our best distribution engineers in charge, and the work has been underway for nearly 2 years without one disturbance to our property.

Special Inspection on Other than Subway Work.—As before stated, in New York the patrolmen turn in daily a list of all street openings made by other companies, and these locations are turned over to the

district foremen, who inspect them and report to their district superintendent on the advisability of assigning special inspectors. Wherever conditions warrant it, a competent gas man is placed on the work, or on several different jobs if they are close to each other. These inspectors are provided with tools and appliances so that in event of damage they are able to take such steps to prevent trouble and interruption of service. The presence of these inspectors is of great benefit, as the crowded sub-surface conditions in most of the streets of Manhattan make it certain that some underground property will suffer. Before it was our policy to assign these inspectors, it was quite common to find our mains built into manholes or with other heavy structures resting upon them. Where blasting is in progress in proximity to our structures, stopper-holes are always tapped in the mains, and before each blast the inspector inserts the stoppers so that in event of a break no great damage can be done.

Another class of work, that requires constant vigilance is excavation for building foundations. Land is enormously valuable on Manhattan Island, and consequently the architects make use of all available space both in a horizontal and a vertical direction. Therefore, these very deep excavations extend to or within a few feet of the curb line and are not always properly sheathed and braced. Wherever possible, we consider discretion the better part of valor, and cut off all mains liable to be endangered by a failure of the sheathing, or stopper-holes are tapped in the mains on either side of the excavation, and the necessary stoppers kept where they may be quickly secured by the inspector and inserted. For work of this character we have recently developed what we call a "surface inserted stopper." This is an ordinary gas bag with a long pipe-stem, and it is inserted through a standpipe that has been previously brought to the surface, and is protected by a street box with a special distinguishing cover, which enables us to locate them readily. (Fig. 9.)

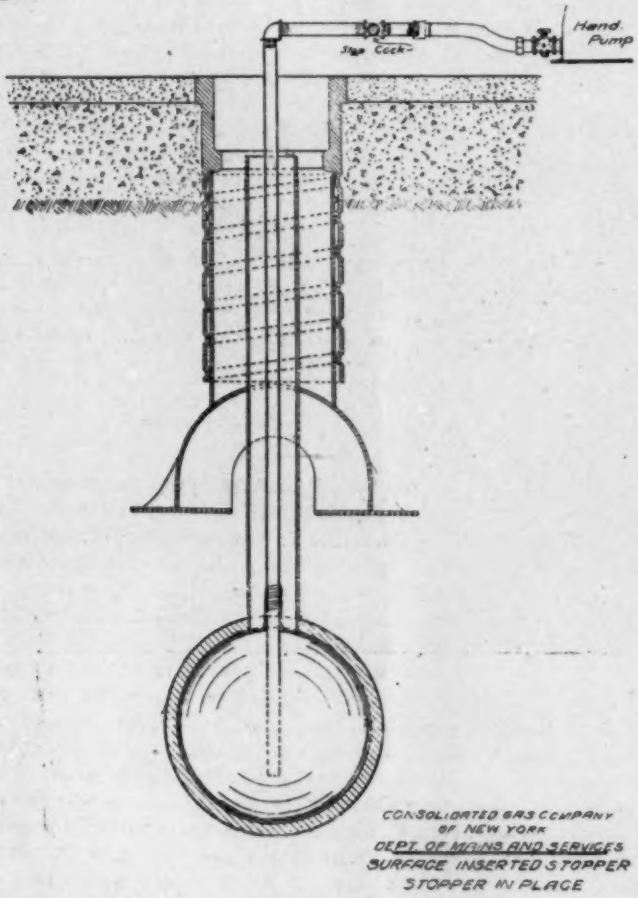

Fig. 9.

I was considerably amused by an item in a British publication describing an occurrence resulting in the breaking of three mains. The article stated that "The first man arrived at 1:30 A.M., and the final stopper was inserted at 8:30 A.M., stopping all escape of gas," and closed with the statement—"The dangerous work was successfully carried out without an explosion occurring, without the gas firing, and without injury to anyone." If our British friends had expended 5 or 10 pounds in taking some of the precautions above described, the final stopper could probably have been inserted 5 minutes instead of 5 hours after the accident. In Chicago, the soil is of such a character that foundation work is exceptionally dangerous, a special corps of inspectors, under charge of an engineer, being assigned to the work. The engineer inspects all building excavations and watches caisson sinking for evidences of quicksand, taking levels on the street surface for signs of settlement. He indicates necessary action for protection of mains and services, providing the necessary stopper-holes or perhaps cutting off and capping the mains.

I do not think that in streets through sparsely populated territory it would be well to entirely neglect inspection. We have an example of a suburban company supplying villages in Westchester County. In their largest city, Yonkers, the distribution system is systematically patrolled according to a schedule which covers each street once a month. In the suburban residence towns, no systematic patrolling is done. The transmission mains; are patrolled daily during 6 months starting October 1st, and for the last 2 weeks in December on Sundays. During the balance of the year, the important sections of transmission mains along which work is being done by other companies are patrolled daily, the balance of the transmission system being patrolled on a weekly schedule. Where other companies are doing work along the lines of transmission mains inspectors are placed on the work, the number varying according to the importance of the main and the danger.

If work is being done along distribution mains, an inspection is made daily; and as a general proposition stopper-holes are provided so that the main may be quickly shut off.

The Westchester Lighting Company endeavors to have other companies do their blasting in the morning so that if a main is broken time will be available for repair before the load comes on at night. They find that, unless they take extreme measures and are exceptionally careful in co-operating with others whose structures are encountered during construction work, it is impossible to obtain co-operation from them; and this co-operation is of great importance to a company supplying a large suburban territory.

Conditions vary greatly in different sections of the country, and it would hardly be possible to suggest any system of inspection or patrol which would not have to be greatly modified for any particular locality. The engineer in charge of the distribution system must judge for himself the risks involved and then make certain that every possible precaution is taken to avoid serious damage.

Inspection and Patrol of High Pressure Mains.—High pressure mains are a different proposition, inasmuch as breaks in the main are more likely to be found than small leaks, and these breaks, owing to the considerable volume of gas escaping, are ordinarily detected and reported at once by citizens.

The Western United Gas and Electric Company patrols its high pressure system twice every year—once in the fall, before cold weather, and again in the spring, after the frost has left the ground. In addition to these inspections, they patrol different sections of their lines from time to time when breaks are suspected. These patrols are not as thorough as those in the spring and fall, as they are made only in the event of a break, and for its discovery. In the periodic inspections men familiar with the mains walk over the streets, paying special attention to any indication of leakage, either smell or dead vegetation. The patrolmen also examine all culverts and drains crossed by the mains, and barring is done when the aggregate amount of the leaks appears to warrant it. Many of the towns are supplied by reducing regulators, which maintain a constant pressure of from 8 to 10 pounds. At the outlet of these regulators connections are provided for a Westinghouse high pressure meter, and once a year a test is made by connecting up a meter at the hour of minimum consumption. From an experience of 14 years they consider this patrolling of sufficient importance and value to be systematically carried out.

In Chicago, streets containing high pressure lines are patrolled twice a week, and the vaults and the valve basins constantly inspected by a special crew.

The Detroit City Gas Company patrols the streets containing high pressure mains once a year, usually late in the fall. This consists ordinarily of an examination for surface evidences of leaks, or the presence of gas in the manholes of other sub-surface conductors. Where evidences of leakage are frequent, organized barring over the affected district is usually resorted to.

THE plant of the Waxahachie (Tex.) Gas Company has been satisfactorily put in commission. It starts out with close to 400 consumers.

The Value of Display.

[Paper read by MR. R. O. JASPERSON at the December Meeting, National Commercial Gas Association.]

The value of effective display, whether in newspaper advertisements, booklets, circulars or window cards, cannot be measured. In scientific advertising much stress is placed upon the character of the appeal to be made, but it is certain that the manner of presenting the appeal is equally important, for it must be obvious that no matter how convincing the appeal, it's value is far below par if it is not read. In fact, the success of any given piece of copy as a business getter depends upon the manner of its presentation.

Since it has been decided to open this session of the publicity committee to all members of the association and invite discussion, the scope of this discussion will be broadened somewhat, and the subject treated in a more elementary way than was the original intention.

Featuring the news element in advertising is one of the most effective methods of attracting attention to what you have to say. Therefore, the arrangement of a display ad. should be such as to first of all arrest the attention, then by its arrangement, phraseology and news element, perform its function as a selling talk.

In instructing a cub reporter in the rudiments of news writing, he is told to state the facts as quickly, as simply, and as forcibly as possible. Usually a simple statement of an important fact, unembellished with fine language, is vastly more effective than an introduction sparkling with bright gems of expression. After the plain statement he is required to give additional information, elaborating as he progresses, so that should it be necessary at any point to end the narrative, the story would still be complete.

In writing a gas advertisement, it is well to make some positive assertion, either by means of picture or printed statement, to arrest attention. Once the attention is arrested, you have an opportunity to say what you have to say. Every element that will contribute to making the first appeal should be considered. *Herein lies the value of display.* An ad should be constructed so that the eye naturally wanders from the main statement or appeal to the salient points. Thus the reader who is scanning through his newspaper will subconsciously gain an impression that may later be a potent factor in the consummation of a sale.

This brings us to the subject of white space in display advertising. Advertising men, as a rule, believe in the liberal use of white space. Many advertisers, however, fill this space almost to the limit. Department store ads., for instance, are usually constructed with the idea of utilizing every square inch of space. The way to create is to use *white* space in the midst of ads. which are devoted entirely to reading matter. Were it the rule in newspapers for advertisers to use much white space, I would be tempted to change this opinion. How to use the white space advantageously is a matter that each individual must work out for himself. The simple expedient of studying the works of acknowledged advertising experts with the idea of stimulating an intelligent analysis of successful ads. is most excellent.

Typographical symmetry is a matter that cannot always be left to printers. It would be presumed that printers know all about the advantageous use of type, but it is true that many printers left to their own devices do not show their supposed familiarity with the best methods. Therefore, I have adopted a plan of drawing a dummy for every piece of copy submitted. In this way the printer gets an intelligent idea of what was in mind when the advertisement was written. It is advisable to letter the display lines in about the size desired, and simply draw lines for the rest of the ad. according to the approximate size of type desired. While it is not well always to exactly specify the kind of type wanted, as it is difficult to judge the exact amount of space that the article will fill, it is well to study the different sizes of type and judge in a general way how much matter can be set in a given space. This practise of preparing a dummy will tend to impart to your advertisements any individuality you may have. It is well that a series of advertisements should have a family resemblance, which is a likely result of this method of preparation. There is a decided advantage in having gas company advertising sufficiently individual to enable the reader to tell at a glance that it is a gas company ad. and not the advertisement of the electric company, or of some individual dealer who may be handling appliances.

I am reminded of what was told us last year at Atlanta by E. St. Elmo Lewis, when he discussed the subject of preparation of advertisements. He impressed us with the idea that an advertisement so cleverly prepared and displayed as to attract attention and make an impression only by reason of its eleverness, is a less valuable advertisement than one which is remembered for its forcefulness. It is better to have made an impression upon your reader by the *soundness* of your *logic* and the *eloquence* of your appeal than to have made the impression by mere general appearance and arrangement of type or cleverness of illustration.

The 100 per cent. perfect ad. is the one that, after it has told its story, is sufficiently strong to send the reader down to the gas company to buy the appliance advertised. Everyone knows that the 100 per cent. ad. is practically impossible. The best we can do is to halt the attention, drop a few seeds of argument and salesmanship into the mind of the reader, and then wait for results.

Frequently we hear of discussion of the subject whether or not illustrations add or detract from advertising. The answer is, that illustrations add or detract from advertisements in proportion to their power to arrest attention. If a picture is sufficiently graphic to tell its story without words, it is invaluable. If it is a mere picture requiring much explanation it is useless. Its value depends upon its ability to arrest attention and create the impression which later will result in a sale. In the arrangement of illustrations it is well to give particular consideration to its relationship with the text. This again is a matter for the individual to work out for himself by observation and experiment.

In conclusion I repeat that it is as important that your advertisement be as well arranged as the quality of the text. A well arranged ad. is one that is most likely to be read. The test of the successful ad. is—will it be read? Will it promote sales?

The whole subject of advertising abounds with abstractions, and it is diffiult to lay down specific rules either for the preparation of the copy or for arranging its display. It looks easy after it is finished and as a result nearly everyone, until he has actually tried it, has an idea that he can prepare copy and give directions for its display. Ask a truck driver if he wants a job running an elevator and he will say he doesn't know how to run an elevator. Ask him if he would like a job shining bright work, polishing stoves, or collecting bills, and he will cheerfully admit that he doesn't think he could learn, but you ask him if he wouldn't like to take charge of your advertising, and he will climb right down off of that truck and say: "That's one job I know I can do. When do I begin?"

Every advertising man becomes more and more impressed with the difficulties he must encounter and from an attitude of cocksureness and self-sufficiency he becomes sufficiently humble to enable him to learn, and as he learns he becomes more and more valuable to those whom he serves.

Enormous Coal Production.

A production between 565,000,000 and 575,000,000 short tons of coal in the United States during 1913 is the official estimate of the United States Geological Survey, an increase over the record-breaking production of 1912 of 30 to 40,000,000 tons, the increase being normal and an index of the general industrial activity of the country. Of this increase about 4,500,000 tons was in anthracite and the rest in the output of the bituminous coal mines.

There were a few labor disturbances, local in extent and effect, the most pronounced in Colorado, where a general strike was called about the middle of September, and coal production in that State during the last quarter of the year was but about 50 per cent. of normal. There was general complaint, particularly in the eastern States, of shortage of labor and inability on the part of the operators to keep their mines working at full capacity. This was probably the reason for the less than usual complaint of the inadequate or insufficient transportation service. Coal mining, like all other industries in the Ohio Valley States, was seriously interfered with by the floods in that region during the spring, and probably from 5,000,000 to 10,000,000 tons of coal would have been added to the year's output but for this. As there were no violent fluctuations in the demand by manufacturing industries, the demand for coal for those purposes showed only a normal increase. The continued decrease in the production of fuel oil in the mid-Continent oil field and the strike in the Colorado coal mines resulted in an increased output of coal in the southwestern States.

Deficient labor supply was an important factor in enabling operators to maintain prices, and it prevented an output in excess of

market requirements, which would have added one more to numerous preceding years when prices were demoralized by an excessive supply. As it was, there was a slight advance in prices, compared with 1912.

Pennsylvania broke all previous records having a combined production of hard and soft coal of 267,000,000 short tons. Shipments of anthracite in the 11 months ended November 30, 1913, amounted to 63,407,010 long tons, and during December approximated 6,000,000 making the total for the year 69,407,010 long tons. The colliery consumption and the coal sold to local trade represented about 15 per cent. of the shipments, so that the total output during the year is estimated at 79,830,000 long tons, 4,500,000 tons more than 1912, when operations were suspended for 7 weeks during April and May pending an adjustment of the wage scale. As the use of anthracite as a manufacturing fuel has been practically eliminated it is not affected to the same extent as bituminous coal by trade conditions, the principal influence being the temperature during the winter. The mild winter of 1912 and of the closing months of 1913 caused the production to fall below that of 1911. The increase in the use of artificial gas and of coke for domestic purposes will probably keep pace with the increase of population in the markets supplied by anthracite, and there is little probability that the production of anthracite will show any marked increase in the future.

The production of bituminous coal in Pennsylvania showed increases of 10 to 20 per cent. in various parts of the State, due partly to the fact that the production in 1912 was restricted to some extent by the partial suspension of operations on April 1, during the wage-scale negotiations.

Rules of New Hampshire Public Service Commission Respecting Gas Supply.

The Public Service Commission of New Hampshire has issued (effective February 1st) rules prescribing standards for purity, pressure and heating value of gas, and otherwise regulating the service of gas utilities. It is worthy of note that nothing is said as to candle power or photometric tests, the thermal value being accepted as the determining factor.

Rule 1.—In the interpretation of these rules, the word "Commission" shall be taken to mean the Public Service Commission; the word "utility" to mean any public utility engaged in supplying to the public water gas, coal gas or a mixture of the two; and for purposes of testing, a cubic foot of gas shall be taken to be the quantity in a volume of 1 cubic foot when saturated with water, at 60° F., and under a pressure of 30 inches of mercury.

Rule 2.—No utility shall supply gas having a monthly average total heating value of less than 600 B. T. U.'s per cubic foot, tested anywhere within 1 mile of the manufacturing plant; and at no time shall the heating value be less than 550 B. T. U's.

Rule 3.—Each utility which in any year shall have sold more than 20,000,000 cubic feet shall equip itself with a calorimeter and shall determine the heating value of its gas on at least 3 days in the week. A record of each such test shall be made and be open to the public.

Rule 4.—No gas shall contain more than 30 grains of total sulphur, or 10 grains of ammonia, per 100 cubic feet, or more than a trace of hydrogen sulphide. Gas shall be deemed to contain more than a trace of hydrogen sulphide if a strip of white filter paper, moistened with a solution 6½ per cent. by weight of lead acetate, after being exposed for 1 minute to a stream of the gas flowing at the rate of approximately 5 cubic feet per hour, the gas not impinging directly from the jet upon the paper, appears perceptibly darker than a second paper freshly moistened with the same solution.

Rule 5.—Each utility shall daily test the gas leaving its holders for the presence of hydrogen sulphide in the manner specified in Rule 4, and shall keep a record of such tests.

Rule 6.—The Commission will, from time-to-time, inspect the methods of manufacture, and test the quality of gas supplied. A fee of $15 will be collected from the utility for each such inspection.

Rule 7.—Gas pressure, as measured at the outlet of the service to any consumer, shall never be less than 2 inches nor more than 8 inches water column. The maximum daily pressure variation shall not exceed 3 inches water column.

Rule 8.—Each utility shall provide itself with one or more portable recording pressure gauges, and shall regularly, and not less frequently than the Commission may direct, make measurements of the gas pressure, and pressure variation throughout the system. Records of these measurements shall be kept open to public inspection.

Rule 9.—No gas meter shall be placed in service which has an error in measurement in excess of 2 per cent. when passing gas at the rate of 6 cubic feet per hour per rated light capacity of such meter.

Rule 10.—All new meters purchased, and all old meters which have been repaired, adjusted or removed from service, shall be tested and marked with the date of test before being placed in service; and all meters shall be removed and tested at least once every 5 years. During each period of 12 months, until all such meters have been tested, each utility shall remove for test not less than 20 per cent. of the meters now in service, those longest in service being removed first.

Rule 11.—Each utility shall, without charge, make a test of the accuracy of any gas service meter upon request of the consumer, provided the consumer does not make such request more frequently than once in 12 months. A report giving the results of each request test shall be made to the consumer.

Rule 12.—Any gas meter may be tested by an inspector employed by the Commission, upon written application of the consumer, and deposit of the fee fixed for inspection. If the meter is found to be more than 2 per cent. fast the fee paid by the consumer will be returned to him, and shall then be paid by the utility. Each application to the Commission for test of a meter shall be accompanied by a fee of $1, the fee for testing any meter having a rated capacity not greater than 10 lights. For meters of greater capacity a deposit equal to the estimated cost to the Commission will be required.

Rule 13.—The Commission will, from time-to-time, test such meters of each utility as it shall judge expedient. A fee of 50 cents will be collected from the utility for each meter so tested which is of not greater than 10 lights rated capacity, and for each meter of greater capacity a fee equal to the cost to the Commission of testing the same.

Rule 14.—Whenever a meter is tested under Rules 11, 12 or 13, and found more than 3 per cent. fast, the company shall refund to the consumer that percentage of the amount of the bills for the previous 6 months, or for the time the meter was in service, not exceeding 6 months; provided, however, that the Commission in any case may relieve the utility from this requirement to such extent as the facts may appear justly to require. Whenever a meter so tested is found to be more than 3 per cent. slow, the utility may make application to the Commission for authority to render a bill to the consumer for gas supplied during the preceding 6 months, not covered by bills previously rendered; but such application should be made only in cases of substantial importance, and should be accompanied by a statement showing the utility not to be in fault for allowing the incorrect meter to be in service.

Rule 15.—Whenever a gas meter is tested the original test record shall be kept, indicating the information necessary for identifying the meter, the reason for making the test, the reading of the meter before being removed, and the result of the test. This record must be sufficiently complete to permit the convenient checking of the methods employed and the calculations. Records shall also be kept, numerically arranged, indicating approximately when each meter was purchased, its size, its identification, its various places of installation, with dates of installation and removal, and the dates and general results of all tests.

Rule 16.—Each utility shall maintain a suitable meter prover so located as to be shielded from excessive temperature disturbances and equipped with thermometers and other necessary accessories, and approved and sealed by the Commission.

Rule 17.—Bills rendered periodically for metered gas shall designate the reading of the meter at the beginning and end of the interval and the dates of the readings.

Rule 18.—Each utility shall keep a record of all complaints made in regard to service, which shall include the name and address of the complainant, the date and nature of the complaint, and the disposition of the same.

Rule 19.—Each utility shall provide, equip and maintain a station for the testing of gas and gas meters, and such equipment therefor as may be necessary for the testing required by any rules of this Commission, and shall provide such facilities for the use of the Commission's inspector as the Commission may prescribe, to be arranged in a location and according to plans approved by the Commission.

Rule 20.—Each utility, at such times and in such form as the Commission shall prescribe, shall report to the Commission the result of all tests made of heating value, purity and pressure of the gas supplied by it, and the number of meters purchased, installed, removed from service, tested, adjusted and repaired.

Standardization of Public Utilities Service.

Dr. E. B. Rosa, Chief Physicist United States Bureau of Standards, in an address before the American Association for the Advancement of Science, on "Standardization of Public Utilities Service," discussed the relation of the Bureau of Standards to public utilities and public service commissions. He said that an important work may be done in standardizing public utility service, not with a view of requiring all companies to conform to one standard, but to have standards, adapted to different conditions, that can be used to judge the performance of any utility.

Obviously, no State commission could undertake to establish such standards of efficiency and performance for all utilities, neither can it be expected that the utility companies themselves will ever formulate such standards. The only practicable way is by co-operation between the commissions and the utilities of the whole country, and the best way of securing such co-operation is for the Federal government to assist. The Federal government, through the Agricultural Department, the Geological Survey, the Bureau of Mines, the Public Health Service, the Bureau of Education and other bureaus and departments, is co-operating with the States in many important lines of work, and such work is undertaken, not because the States cannot do it, but because the Federal government can do parts of it much better than the States.

The Bureau of Standards has been co-operating to some extent with State commissions and utility companies in the standardization of practice and service, but the limited resources of the bureau have permitted only a limited activity. The need of more extended work of this kind has been so generally felt that the Secretary of Commerce has asked for a larger appropriation, and the National Association of State Commissioners, and individual commissions as well, have expressed the hope that the appropriation will be granted.

The Bureau would then be able to maintain a staff of engineers and experts to carry on investigations. It could serve as technical adviser to the State commissions if they chose to avail themselves of its services, and it would also act as a court of appeals in technical questions. It would, of course, have no legal jurisdiction over any utility, and so would not infringe upon the prerogatives of the State commissions, but the influence of its opinion might be of some value to a commission when the public was expecting the impossible, or a utility was demanding too much, or to a utility that was required by order or by ordinance to do what was unreasonable.

It appears certain that a large activity of the bureau in the field of public utility regulation, studying the problems coming before State commissions and municipal regulating bodies open-mindedly and yet conservatively; serving as a clearing house of information as well as an agency for investigation and the formulation of results for general use, would be productive of results that would more than justify the cost.

Many State commissions have abundant authority, but very limited funds to provide an engineering staff. Appraisal and inspection are expensive, and the States will have to grant considerable sums for this, even if the Federal government co-operates to the extent proposed. State commissions, with large appropriations and engineering staffs, will require a minimum of assistance; but most of the States, at least at the start, find need of such help.

The consideration of rates may be divided into two parts: First, what average rates must be charged to provide sufficient revenue to pay expenses, provide for maintenance and depreciation, set aside something for surplus or sinking fund, and pay necessary dividends. Second, how shall these charges be distributed among the different classes of customers for the different grades of service; in other words, what scale of charges is equitable, supposing the total necessary income or average charge for service has already been fixed.

To illustrate, in some places where the charge for electrical energy is 10 cents per kilowatt hour to the ordinary small user of energy, the prices are scaled down as the quantity and load factor are increased (and according to the effect of the load on the station's diversity factor) until it is sometimes as low as 1 cent per kilowatt hour. On the other hand, the price of gas to different customers seldom varies by so great a ratio as 2 to 1, and often the rate is the same to all, regardless of quantity or cost of delivery. There are good reasons why the difference should be less for gas than for electricity, but the practice should not vary as much as it does in different places either in gas or electric rates.

Much study has been given to rates, but there is still much difference of opinion on both theory and practice. Rates are fixed with regard to other considerations than the cost of the service, and the evaluation of such considerations as well as of the cost is difficult indeed. How to distinguish between what is proper and improper is the main question. It is of great importance that the State commissions co-operate in the study of the problem, and the utility companies should welcome such study.

To suggest that it is too delicate to be discussed in the open creates the suspicion that there is something to conceal. When there is adequate regulation such a study would be made from the standpoint that whatever hurts the utility company hurts the public, and rates that permit the company to build up its business enable it to give better service to all its customers. In other words, where regulation is adequate and just, the interests of the utility and of the public are one; rates which are just and equitable will contribute to the maximum development of the business.

Public utilities are not regarded as entitled to charge all the traffic will bear, or to make all the money they can. They are now considered as of a public character, enjoying a monopoly, but owing a duty to the public, are entitled to only a fair return on their investment. If a city wishes to own its utilities it may not build new, and disregard the rights of the companies, but must purchase the properties at fair valuations. Neither should a city grant a franchise to a competing company, for one company with all the business can usually render better service than two with the business divided between them.

Thus the utility company is guaranteed a monopoly of the business, protection of its capital and a fair rate of return. It in turn is expected to render the best service possible for the charges made. To secure good service and good management, competent operators must be employed, and the rates must be high enough to permit paying good salaries and good wages. In short, the public pays all the expenses of operating the utilities, and the waste due to inefficient management, if there be such, and the expenses of the commission which regulates the utilities.

It is, therefore, no wonder that there is a public demand for competent regulation of public utilities by commissions, such regulation comprehending rules specifying the service that shall be rendered and fixing rates to be charged, and including effective inspection to see that the management is competent and efficient.

It may appear to some that a commission is going beyond its proper sphere when it inquires into efficiency of management and honesty of administration. But if it be conceded that the stockholders are to receive a fair return on their investment, and the public is to get no better service than the company can give consistently with its rates, any loss due to inefficiency of apparatus or incompetent management comes out of the public rather than from the officers or stockholders.

Such regulation corresponds with the view that "The fundamental relationship between the public and its public utilities is that of principal and agent." But it will require years to develop such regulation to a state approximating completeness and perfection.

The principal elements which determine the value of service are quality and quantity, and in some cases the time and rate of delivery. The quantity may be measured by meters or by count or time, or by the distance traveled. It is comparatively easy to measure quantity of service, although vigilance is needed to insure satisfactory meter accuracy, but to specify the quality of service and to determine what is good service and to ascertain whether the quality of service specified is actually rendered, are much more difficult matters.

There is no absolute standard of quality. In general, the better the service the more it costs, although the difference in cost between good and indifferent service is not the same under all circumstances. Aside from difference in quality of service, due to different conditions, it is difficult enough to specify what constitutes safe and adequate service under average conditions.

For gas service it has been done more or less successfully for many years, and in many cities gas inspectors make systematic tests to ascertain whether the service specified is being furnished. The Bureau of Standards has made an extended study of the subject of specifications for manufactured gas and gas service, and a detailed report on the subject has been published. But no corresponding publication has been issued for electric service, although there should be such.

Whether a manager is spending the stockholders' or the public's money, it is very desirable that as definite service specifications as possible be formulated for his guidance both in the equipment and in the operation of his plant.

(*Continued on page* 58.)

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NOTICE TO ADVERTISERS.

New Advertisements and changes of copy therefor should be in hand Wednesday noon of week prior to date of issue.

NEW YORK, MONDAY, JANUARY 26, 1914.

[Official Notice.]

Forty-fourth Meeting, New England Association of Gas Engineers.

New England Association of Gas Engineers,
Office of the Secretary,
East Boston, Mass., Jan. 6, 1914.

To the Members, New England Association of Gas Engineers: The Fourty-Fourth Annual Meeting, New England Association of Gas Engineers, will be held, Wednesday and Thursday, February 18 and 19, 1914, at Young's Hotel, Boston.

Papers on timely topics of interest are being prepared.

Applications for Membership should be sent to the Secretary before February 17th. "Questions" should be sent early so they may receive ample consideration.

The annual dinner will be Wednesday evening the 18th.

N. W. Gifford, Secretary.

DEATH OF MR. CHARLES F. PRICHARD.

With exceeding sorrow we report the death, on the night of the 21st inst., of Mr. Charles F. Prichard, Vice-President and General Manager, the Lynn (Mass.) Gas and Electric Company; Past President, New England Association of Gas Engineers; Past President, The American Gas Institute; 17th on Chronological list, non-Resident Member, Society of Gas Lighting; Charter Member, Guild of Gas Managers. The funeral services were held the afternoon of last Saturday.

BRIEFLY TOLD.

The Engineer's Part in the Regulation of Public Utilities.—This subject was recently discussed at the Stevens Institute of Technology, by Dr. A. C. Humphreys, President of the Institute, and Messrs. J. W. Leib, Jr., Vice President, New York Edison Company; Newcomb Carlton, Vice President, Western Union Telegraph Company; George Gibbs, Consulting Engineer, Pennsylvania Railroad Company; and James E. Sague, Public Service Commissioner, Second District, New York. Dr. Humphreys cited cases of unfair discrimination by some Commissioners, and urged that it was wrong to authorize any body to exercise the three-fold function of legislative, executive, and judicial authority. Such bodies of themselves need regulation, and too many of the men appointed are not qualified to properly exercise these very wide powers. So many of the questions to be decided require engineering training and experience for their solution, yet it was most rare to find competent engineers serving as Commissioners. Mr. Carlton agreed that more engineer commissioners were advisable, but he feared that men of the caliber needed could not often be obtained, unless their patriotism was a controlling influence. Mr. Leib said that the professional politician was likely to be strongly represented in the make-up of commissions, which could not be in the pubic interest, and showed a state of things not reflecting wisdom or foresight in the appointive or elective powers, and hardly creditable to the authority and influence of the engineering profession in the conduct of public affairs. It was a matter of surprise that the commissions had done so well in many cases involving purely technical or engineering matters. In the treatment of rate questions (in addition to the commanding questions of company policy and commercial expediency) the involved factors were largely engineering questions, and their determination must naturally depend upon engineering knowledge and experience. These questions involve physical valuation, functional depreciation, normal wear and tear, obsolescence, supersession, adequacy of equipment, betterments, etc., and must be approached from the engineer standpoint. On the other hand, such matters as the ultimate property value for rate-making purposes, the rate of return, going-concern value, and the building of the rate structure, were matters which required something more than engineering judgment Many of the questions involved were the results of the laws of supply and demand, of economic production and distribution, etc.

Mr. Gibbs' remarks, which were read by Dr. Humphreys, declared that an engineer in the position of business manager or public utility commissioner gets out of touch with the details of professional progress, and his decisions must rest upon general knowledge, which was not always a true guide. The matter of proper commission organization was fundamentally one of selecting faithful men, of sound judgment and organizing ability, previous specialized training being a matter of less importance. If the selection of commissioners were of the character mentioned, a long office tenure would be to the great advantage of the community, and it seemed a great pity that the frequent changes now the rule should deprive the public and the corporations of the benefit of experience acquired while holding office. The internal organization should include a permanent engineering staff, headed by an engineer of eminence, and the retention of outside engineering consultants, specialists in the various lines of engineering advice needed. Mr. Sague, who was the last to speak, remarked it was peculiar that engineers had taken so little interest heretofore in a State regulation which affected the business success of practically all engineers. He believed that legislation involving details of operation in public utilities should be a matter of last resort. An increased demand for public ownership could be expected, unless regulation were made so efficient and just as to reasonably satisfy the public need. At the same time, it was necessary to preserve to public utility managers their right to enthusiastic and successful work and to the stockholders their just return. Commission regulation was still in the "stone age" of its development. There was no precedent to guide the governors in their appointments, or the commissioners in the exercise of their duties. Lawyers could afford to accept commission appointments better than could engineers of equal grade, as the work did not seriously interrupt their legal career and might be a decided help. It was the right and duty of engineers to take part in the solution of these great problems, which could be settled properly only after the truth had been ascertained, and a fundamental duty of engineering was to ascertain the truth and work in accordance with it.

Commission Asks for More Authority.—The Public Service Commission, Second District, New York, has requested the Legislature to broaden its powers in several directions. One of the things it asks is that it be given authority to suspend rate increases by public utility corporations, pending adequate investigation of their reasonableness. In its annual report it thus calls attention to the improvements in corporation accounting: "The Commission's Division of Statistics and Accounts has done much to foster a widespread appreciation of the importance of rigidly accurate standards for published financial statements of corporations. The improvement each year in the annual reports filed with the Commission is the best evidence of the Commission's success in this branch of its work. The fundamental principle of the Commission's accounting system is that all property and rights which constitute the permanent investment of a

business shall appear upon its books at cost. With the establishment of regulative commissions, the need has been made evident of accurate records which will show beyond any reasonable doubt what has been actually expended in perfecting the organization of a public utility corporation and constructing its property."

A Tax on Light.—What seems a return to medieval times, when householders were taxed for each window in their dwellings, is the proposition of the French government to put a tax on gas and electricity, similar to the taxes already imposed on candles, carbide and oils. It is proposed to impose about 1 cent per B. T. U. for current, and about 5 cents per 1,000 cubic feet of gas; exempting the quantities used for public lighting and for industrial purposes.

February Meeting, Philadelphia Section, I. E. S.—The next meeting of the Philadelphia Section, Illuminating Engineering Society, will be held under the auspices of Drexel Institute, Saturday, February 7th, at 8 P.M., in the Institute. President Bond, of the Illuminating Engineering Society, will deliver a lecture on "Light, and How to Use It." Admission will be by card, which will be forwarded to every member of the Section. Any friends accompanying a member will be admitted. This meeting promises to be particularly interesting, as the student body of the Institute will be present, and Professor Bond is certain to be particularly careful to present the subject in a manner that will prove valuable to his audience.

Water Gas in Paris.—The Paris (France) City Council has authorized the Paris Gas Company to add water gas to its coal gas supply, stipulating that the carbonic oxide in the mixed gas shall not be in excess of 11 per cent. As the quantity of CO in Paris coal gas is equal to about 8.35 per cent., this permission will allow only about 8 per cent. of water gas in the mixture distributed.

The Utilities Engineering Corporation.—A corporation which was formed last December, under the laws of Michigan, with the title of "The Utilities Engineering Corporation," and with offices in the Michigan Trust Building, Grand Rapids, is now actively engaged in business. Its president is Mr. A. Irving Snyder, who recently resigned the position of Superintendent of Manufacture, the Grand Rapids Gas Light Company, to take up this special line of work; and it is upon him to have the active direction of the Company. Regarding that line President Snyder declares that the Utilities Engineering Corporation is an association formed to carry on the business of managing, operating, designing, constructing and supervising public utilities and allied enterprises. Its scope covers every branch or department in the affairs of a public utility, whether municipally or privately owned, or controlled by a so-called holding company. The Corporation of itself has no ownership in any utility. It is backed by ample capital, and to show whether or not its Presidency is in competent hands, this short mention of Mr. Snyder's prior responsibilities may not be amiss: Following a course in Mechanical Engineering, Purdue University, Ind., he secured the position of Assistant Superintendent, the Louisville (Ky.) Gas Company. Three years thereafter he acted as Engineer, the gas bench division of the business of the Laclede Christy Clay Products Company, St. Louis, and then served the Sedalia (Mo.) Gas and Electric Company as General Manager, at the time that property was owned by Messrs. J. L. Green and L. M. Rumsey, of St. Louis. In 1907 he became a partner in the H. H. Snyder Company (Engineers and General Contractors), with headquarters in Louisville, Ky., and in which concern he retains an interest. In 1910 he returned to the service of the Laclede-Christy Company as Engineer, and left that concern in 1911 to take service with the Grand Rapids Gas Light Company. We wish Mr. Snyder and his associates all possible success over their venture in the field selected.

CURRENT MENTION.—

The gas rate at Fort Madison, Iowa, has been automatically reduced to $1.20 per 1,000 cubic feet, through the clause in its ordinance that provides for a reduction when its output per year reaches certain named quantities.

Certain yawping constituents (including, of course, one member of the daily press) of Cedar Rapids, Ia., will not relish the first monthly report submitted by the City Chemist, Mr. L. H. Goebel, acting as official gas examiner. The malcontents were constant in their averments that the gas was of low heating value, that it was not properly purified, etc. Well, here is the exact status of the gas certified to by Mr. Goebel: Standard average heating value, 600 thermal units; actual value of gas supplied, 614—the minimum was 601.30; the maximum, 622; sulphur allowable, 30 grains per 100 cubic feet; actual present, an average of 12 tests, 10.13; ammonia content, .218 grains per 100 as a maximum; on 5 tests, none was present; average of 15 tests, .027 grains. No trace of sulphide was reported on any day. Mr. Goebel thus closes his official statement: "The gas has been well up to the standard set by the ordinance at all times." How is that, Messrs. Malcontents?

Mr. Edward Graves Storey, for several years Treasurer of the Brookline (Mass.) Gas Company, prior to its amalgamation with the Boston Consolidated Gas Company, died at his home (815 Beacon Street, Boston, Mass.) the evening of the 20th inst. He was in his 56th year, having been born in New York City, February 18, 1858. He is survived by his wife. Interment was made in Middletown, Conn., the afternoon of the 22d inst.

"B. L. L.," sends this from Boston, under date of the 20th inst.: "The third annual ball of the Employees' Relief Association, the New England Gas and Coke Company, was held in Roughan Hall, Charlestown, the night of the 19th inst. The affair was for the aid of the sick and death benefit fund and the officers had the satisfaction of knowing that 500 members and friends responded to the summons. The pleasure of the occasion was greatly augmented or heightened in the reading of a letter (with checks inclosed) to the President of the Association (Geo. D. Gesner) from Supt. J. M. McClellan. The messages contained the best wishes of President James L. Richards, of the Boston Consolidated Gas Company, and from Supt. McClellan; also as pleasing memorials two checks (one in $225 from the Company, and $25 personally from Mr. Richards) for the fund. Superintendent J. Conde was a guest of the Association, and a plenty of refreshments was served during intermissions. The main ones in directing the proceedings were: George D. Gesner, D. J. Hurley, Henry Maguire and John Wallace.

The Gas Machinery Company is furnishing a 10-foot, double-superheater, carbureted water gas apparatus for the Elizabethtown Gas Company, Elizabeth, N. J. This machine is a duplicate of the two 10-foot sets installed when the new water gas plant was built in Elizabeth in 1907.

"B. M.," writing from Reading, Pa., under date of the 19th, sends this: "Here is another evidence of the 'grinding nature' of a gas company: At the last session of Council a resolution was passed, transferring $200 from item 22 to item 21, department of finance, which money was appropriated by the former Council for the lighting standards in front of the Library building. But, through the courtesy of Mr. John H. Keppelman, Superintendent of the Consumers' Gas Company, and member of the Board of Library Trustees, the standards were presented to the Library authorities."

Advices from Topeka, Kas., are to the effect that the formal order for the gas hearing to be held before the Public Utilities Commission, to determine a heat unit standard for natural gas, names the 24th February as such date. All the natural gas companies and distribution agencies in the State are cited to then appear before the Commission, and all communities using natural gas are asked to send representatives. The hearing, if carried out on the scale proposed, will be the most extensive and complete probing into the Kansas natural gas situation ever attempted by the Board. It is arranged that the hearing shall bear upon quantity available, its sources, quality, pressures, and heating value; in fact, every available information will be sought.

"Benson," writing from Key West, Fla., under date of the 17th inst., says that the Board of City Commissioners, St. Petersburg, Fla., through Commissioner C. D. Hammond, have, through the J. B. McCrary Engineering Company, Atlanta, Ga., been getting out plans and specifications for a gas plant to be operated on municipal account. The call for the special election to vote the bonds, and the results thereof as well, are mere matters of detail now, considering the overwhelming majority given at the referendum election some time ago to determine whether or not a gas plant should be built. There is no question whatever that the plant would be sustaining from the start, and it is a surety that St. Petersburg will have a gas supply by next fall."

(*Continued from page* 55.)

This does not mean that such rules need be carried to unnecssary extremes, but that, in a careful and conservative way, and with the co operation of the utility companies, rules be prepared which are both reasonable and progressive. In other words, they may be largely self-regulating, just as other corporations may obey the law voluntarily, if it is sufficiently clear and explicit so that it can be readily understood. For the information of the public it is important to have such specifications, that it may be generally known what the companies are expected to do.

Managers of utilities can report their performance to the municipalities or public service commissions, and they can receive public credit for good performance as well as criticism for poor performance. In short, it seems as necessary for the public utilities to be standardized as to service and efficiency and to have regulations or specifications adopted for each class of utilities as it is to have specifications written to accompany contracts for other kinds of service.

To make clear why the Bureau of Standards is the proper agency to undertake this work it is desirable to explain briefly what the Bureau is, and to give some examples of work that it has done.

The Bureau is a national standardizing and research institution, working chiefly in the fields of physics and chemistry, and of electrical, mechanical and civil engineering. Foods and drugs, as known, are studied and tested by the Bureau of Chemistry of the Agricultural Department; geological problems by the Geological Survey; the problems of mining and the economic treatment of minerals by the Bureau of Mines; meteorological problems and weather prediction by the Weather Bureau, and a score of other bureaus have their various fields of activity. The Bureau is investigating and testing many of the instruments used by the public utility companies, and it has an unrivalled equipment for such work. It has also investigated some of the problems of the utility companies and has an organization ready to take up further work as soon as the funds are provided.

The Bureau of Standards always seeks information at first hand, and in studying utility problems it works in the fields as well as in the laboratory, and freely consults those having valuable experience. As a national bureau it has the advantage of getting information from all parts of the country and from all classes of engineers and operators. Its engineers and experts are unbiased and absolutely independent, so there is less likelihood of prejudice from personal interest or preconceived notions than if the investigations were of a local character.

One phase of gas manufacture that has received considerable attention is the most economical heating value for different kinds of gas. At the present time the Bureau is making a study with reference to gas made from crude petroleum on the Pacific Coast, which study is undertaken at the request of the Public Service Commissions of Oregon and California and a committee of the gas companies of the Coast. The results of this study will be utilized by the State Commissions in fixing the requirements of their respective States.

An extended study has been made of the damage caused to gas and water pipes, lead cable sheaths and reinforced concrete by the electric currents of street railways, and of methods of preventing such damage, and very valuable results have been obtained. The handling of this subject by public service commissions is perhaps not expressly authorized by law; but as it is a case of the electric current used by one utility destroying the property of others it is of concern to these commissions, and the methods employed by the Bureau are applicable generally.

Explicit Directions for Meter Reading.

[Communicated by Mr. L. G. Treleaven.]

Your issue of December 15th (page 377) contains an article regarding a "Booklet," compiled by Mr Robert W. Goodnow, of Kansas City, Mo., giving explicit directions for meter reading. I would like to suggest that you start a campaign to bring together as many as possible different directions for reading gas meters, with the object in view of culling from the whole, a comprehensive set of directions which will be accepted as standard.

Out of scores of "directions" which I have read and studied, not one appeared to fill the bill. While some are reasonably clear as to the illustrations shown, the picturings almost invariably show readings of the simplest nature; that is, where each hand is about in the center of the space between two figures. The difficult readings, or those where one or more of the hands has almost completed a revolution, are usually ignored. The illustrations in Mr. Goodnow's booklet are an exception to this, but they could be made considerably clearer, to a person knowing nothing about reading a meter, by a little fuller explanation.

As a very large percentage of complaints of high gas bills could be averted, if the consumer were educated to keep track of his gas consumption by reading his meter (a point conceded by all gas men), I believe it would be worth while to expend the energy necessary to give him a right start by furnishing him with a comprehensive set of directions, such as could be readily understood by the average consumer.

I have tried my hand at writing a set, aiming to overcome the objections stated above, and while I feel that my effort is an improvement on most of these I have seen, I realize that further improvement can be made and it is with this in mind that I offer the suggestion.

The thought is a good one, and we hope that those interested (and these should include almost everyone concerned in gas distribution) will avail themselves of our columns to follow up the suggestion of Mr. Treleaven, who, by-the-way, is the Secretary-Manager of the Consumers' Light, Heat and Power Company, Topeka, Kas.

To begin the campaign we herewith reproduce that devised and followed by Mr. Treleaven, now being freely distributed in his Company's territory. This description, on account of both clearness and simplicity, furnishes an excellent starter in the proposed discussion.

Directions for Reading a Gas Meter.

The small hand in the circle at the top, marked "Five Feet" is used for testing only, and need not be taken into consideration.

The four lower circles record the consumption of gas, each complete revolution of a hand representing the quantity of gas marked above the circle, each figure in the circle representing one-tenth of that amount. The reading shown is 366,800, meaning that 366,800 cubic feet of gas has passed through the meter since all the hands were at the zero point. In order to find out how much gas has been used in any period two readings of the meter must be had; one at the beginning of the period, the other at the end. Then the difference between these two readings—that is, the first subtracted from the second—will give the amount of gas registered. If you wanted to know how much time you have spent on a piece of work it would do you no good to look at the clock when you were through, unless you knew what time you started, so you compute gas consumption on a meter exactly as you would compute time on a clock. Another comparison to a clock, which, if remembered, will prevent mistakes in reading a meter, is this: After a hand has passed any certain figure in a circle, the hand in the circle to the right must make a complete revolution and be back to the zero, before the next higher figure can be read, or on exactly the same principle that, at 1 minute to 11, the time is 10:59, although to look at the hour it is already on the 11 mark. The hands on the different circles do not all travel in the same direction. In reading, follow the direction of the figures, always taking the figure which the hand has passed, not necessarily the nearest one. Put down the figures in the same order as the circles from which they are taken, then place two ciphers at the right, on account of the figures in the right hand circle representing hundreds, and you have the total registration of the meter. The difference between this reading and any other reading will give the amount of gas used in the period between the two readings. A few trials will make meter reading easy. Try it; we want you to learn.

An Important Rate Decision, Manitowoc, Wis.

The Wisconsin Railroad Commission, having carefully considered, in all its phases, the plea of the Manitowoc Gas Company to be allowed to increase its selling rates, has decided in favor of the Company. The Commissioners findings are in substance as follows:

The Manitowoc Gas Company asks permission to increase its rates on the following main items: Commercial gas from $1.25 per 1,000, with 25 cents off for payment in 10 days; and industrial from $1 per 1,000 for first 10,000, and 80 cents per 1,000 for all in excess, to a new scale thus based: Gas for all uses, from $1.35, gross, for first 1,000, and down to 70 cents gross per 1,000 on a monthly use of 30,000 cubic feet; all in excess of 30,000 to be billed at the rate of 63 cents. The petitioner introduced relatively little evidence in the hearing, its attitude being that the necessity for an increase, at least as to the figures submitted was so clear that evidence to substantiate its contentions was altogether unnecessary. The opinion reviews the rate history of the corporation. The Commission had theretofore acted on rate questions, in cases determined as of July 1, 1909; September 1, 1911; November 1, 1911. All of these amendments in the Commission's prior decisions affecting successive reductions in gas rates "Were made voluntarily by the utility in the belief that there would be a resulting development of the business." Consumers actually did increase and sales were augmented, as follows:

Year.	No. Consumers.	Quantities Sold. Cubic Feet.
1909	1,809	36,341,500
1910	1,929	37,502,800
1911	2,017	40,950,800
1912	2,087	41,634,500
1913	2,152	41,967,100

Continuing, the Commissioners say: "The number of consumers, and the sales per consumer, compare very favorably with the development reached by other gas utilities operating in the State, under generally similar conditions. It is probable that nothing more than a gradual normal development of the business will be experienced in the future." They find that the physical valuation, as of January 1, 1913, allowing 15 per cent. for interest during construction, superintendence, engineering, etc., gives cost (new) $214,708; present valu ation, $184,707. As none of the paving has been actually cut through by the utility in laying pipes, by the exclusion of this item and item of non-operative property, the cost (new) is $205,456; present value, $176,960. In its testimony and brief, "The utility assumed a rather unusual attitude, that, although it considered the value of its physical property to be very much in excess of the amount determined by the Commission, the increase asked for in this case would be required even on the basis of a lower valuation than the utility is willing to accept as final."

In regard to "going value," computations of early losses were somewhat difficult, owing to the fact that the amounts paid for the property (1907) were not altogether clear. The Commission harked back from its valuation of January 1, 1913, by deducting estimate of physical property additions since its acquisition of the property, and computed the accumulated gains or losses since 1907, to find that, "On a 6 per cent. interest basis, the cumulative gains, June 30, 1913, amounted to $22,799; on a 7 per cent. basis to $10,180. If the computations were based on an initial value of $168,092, which as nearly as the records in this case show, was the cost of the plant in 1907, the accumulative gains (on a 6 per cent. basis) amounted to $2,552, and on a 7 per cent. basis the accumulated losses were $12,235." It is then pointed out that the Company's practice of charging all pro motion of business expenses to construction, "Made the net earnings for each year appear greater than if accounts had been kept in compliance with the Commission's classification." This tends to an overstatement of actual accumulated gains and an understatement of losses, but it is clear that no such going value as that claimed by the Company can be substantiated. The Commission finds that in this case it may not be necessary to make a final statement of the value of the property, which seems to be something less than $200,000, which the Commission fixes on as a sum to use in its interest computings.

"An examination of the maintenance charges reported does not show that the policy of the Company with regard to these has been such as to enable it to dispense, at least to any considerable extent, with a reserve to cover depreciation. It is believed that a fair annual reservation is $4,000, although computed strictly upon a sinking fund basis a somewhat smaller annual reservation might suffice. This would leave available for interest and profits $11,525 on the basis of the adjusted income account for the past year. Upon a valuation of $200,000, this would be equivalent to a return of a little less than 5.08 per cent., and on a valuation of $196,000 to a return of 5.9 per cent. In order to obtain a 6 per cent. return on the valuations mentioned additional earnings of $465 and $225, respectively, would be required. To obtain a 7 per cent. return the required increases would be, respectively, $2,465 and $2,185." The opinion then makes a careful tabulation of the "Consumer cost per consumer per month." "Output cost, $0.8056 per 1,000," "Cost per 1,000 cubic feet" on the 6 per cent. and 7 per cent. basis, for cubic feet consumed per month, ranging from 1,000 to 100,000. On the 6 per cent. basis, total costs run from 1.1483 for 1,000, to .8090 for 100,000; on the 7 per cent. basis, from 1.25 to .843. There is also presented a statement of estimated revenues resulting from a number of rate schedules shown. Distribution of sales is figured on records of a number of gas plants for which complete consumer analysis has been made by the Commission believed to approximate Manitowoc conditions. After making all adjustments the Commission finds: "Aside from earnings from residuals and non-operating revenue, as reported for the past year, the total revenue necessary on a 6 per cent. interest basis is $42,531.56, and on a 7 per cent. interest basis, $44,531.56."

Some Advance Information, Bureau Labor Statistics, Jefferson City, Mo.

Artificial gas and by-products, to the value of $4,905,899, were manufactured in Missouri last year by 24 such public service plants located as follows: St. Louis, Hannibal, Jefferson City, Cape Girardeau, Sedalia, Springfield, Louisiana, Moberly, Mexico, Excelsior Springs, Independence, Trenton, St. Charles, Brookfield, University City, Kirksville, Marshall, Chillicothe, Lexington, Columbia, Boonville, Macon, and one or two other smaller places. Quoting a bulletin covering this industry, made public recently by Commissioner John T. Fitzpatrick, of the Bureau of Labor Statistics, constituting "Advance information of the 1914 Red Book." Figures for the vast amount of natural gas consumed in Kansas City, St. Joseph, Webb City, Carterville, Joplin, Cronogo, Carl Junction, Rich Hill and one or two other Western Missouri cities, are not included. Allowing $2,094,101 as the receipts of the companies which distributed natural gas in the western part of the State, it means that the gas industry cost consumers of the State $7,000,000 during the year under consideration.

Of the artificial gas receipts, $4,581,692 came from the sale of gas at an average of 82.5 cents per 1,000 cubic feet. The cheapness of gas in St. Louis, and the vast quantities sold there, brought the average down to the figures just given. Out in the State, the price per 1,000 feet ranges from $1.25 to $1.75. The by-products of gas, consisting of coke, ammoniacal liquor, anhydrous ammonia and ammonia sulphate, sold for $324,207.

The cost of gas to the consumer constitutes a problen in domestic economics, since gas in so many Missouri cities has become a necessity for cooking, heating, and last (and decidedly also worth considering) lighting. The predominance of electric light plants throughout the State has had the effect of reducing the quantity of gas used for illuminating purposes; but, on the other hand, the volume consumed for cooking and heating has increased 50 per cent. since 1910, when the Missouri Bureau of Labor Statistics presented its last "Bulletin" on this interesting subject. The year 1909 was covered then. The total amount of manufactured gas sold that year amounted to 4,686,873,329 cubic feet, worth $4,394,989. Last year the production of artificial gas amounted to 6,055,016,000, the sales from which, amounting to 5,596,301,000 cubic feet, brought $4,581,692. The worth of by-products increased from $279,406 for 1909 to $324,207 for the 12 months now being considered. The gas plants of Missouri are divided into two classes: Those making water gas, numbering 13, and those which use coal for that purpose, numbered 11.

Out of the 6,055,016,000 cubic feet of gas manufactured last year, 458,715,000 cubic feet were lost in some manner before it reached the consumer. In money this represents $376,147. No other business could stand such a drain, and neither could this industry, were it not that the consumers properly foot the bill. The gas manufacturers figure on, and allow for, such losses when they fix the rate per 1,000 cubic feet to be charged consumers, otherwise a gas plant would become a philanthropic enterprise.

How necessary manufactured gas has become for fuel and cooking is shown by the fact that nearly twice as much is consumed for these purposes than for illuminating. Last year the fuel and cooking consumption amounted to 3,698,212,000 cubic feet, worth $2,631,152 the State over; and there were used for lighting purposes, including the large amount consumed by femininity in heating curling irons and other toilet tormentors, 1,898,089,000 cubic feet, worth $1,947,540.

The water gas companies cover two-thirds of the field in Missouri, not considering natural gas distributors, and the annual receipts are, 2 to 1, when compared with plants which manufacture gas from coal. The amount of natural gas consumed in the western portion of the State is much greater than the amount manufactured, reaching nearly 16,000,000,000 cubic feet. When the natural product is exhausted, which period does not seem far away, the consumers of Kansas City will either have to return to the manufactured variety of gas or utilize electricity. The harnessing of the water power of South Missouri will bring about cheaper electricity for that portion.

For the eastern part of the State, as far down as St. Louis, it was thought a year ago that the Keokuk dam electric plant would go a long ways towards solving the lighting and heating problem, by bringing about an exceedingly low rate for electricity. Future legislation will probably establish a reasonable rate for this service, especially since a National highway, the Mississippi river, has been harnessed to furnish this needed public service.

The "Bulletin" of Commissioner Fitzpatrick, touching on the manufactured gas by-products' portion, states that 3,859,348 gallons of coal tar were sold by 24 gas plants, this amount realizing $117,602. The quantity burned by these plants for fuel was not included. The coal tar brought an average of 3.1 cents a gallon. The residue tar of water gas sold for a slightly different price. The different forms of ammonia sold for (approximately) $65,608. There were sold by the coal gas plants 33,607 tons of coke, which, at an average of $4.20 a ton, brought $140,997. The 11 coal gas plants of Missouri used 179,651 tons of coal in manufacturing the gas credited to them.

Gas tar has many uses. Out of it are made creosoting oils for preserving railroads ties and other products of wood. It is used on roads to keep down dust. Benzol and toluol are recovered from it. Aniline oil and salts are among the other products. The tar is used in saturating roof felt, water proofing and briquetting. While coke is worth at an average of $4.20, wholesale, it sells from $6 to $9 retail, depending upon the section of Missouri, from which the demand for this product comes.

By-Products from Non-Coking Coals.

Mr. G. S. Cooper, in a recent letter to the *Gas World* (London, England), says: There are many colliery companies in England the proprietors of which would erect by-product coke ovens if their coals were suitable. Much money has been spent on experimental work, but it has not been found practicable to manufacture metallurgical coke from coal which, under normal conditions, is non-coking, although they are frequently much richer in by-products than many coking coals, so it is particularly unfortunate they cannot be utilized in by-product ovens. However, it is not outside the bounds of possibility to use non-coking coals in processes in which the by-products are recovered. At present two principal alternatives present themselves: (1) Processes of low temperature carbonization, producing smokeless fuel; and (2), the adoption of a producer gas plant working in conjunction with a recovery system. A combination of these two is almost ideal, and the proposition outlined below should be worth the attention of coal owners.

Any process involving the decomposition of coal also involves the production of gas, either in the form of rich gas of 400 to 600 B.T.U., or of producer gas, of a calorific value of 130 to 160 B.T.U. In most cases some use must be made of this gas, for only in exceptional cases can the makers afford to waste it. In a scheme proposed in South Africa, where a large producer plant is to be erected, the coal is so cheap and so rich in nitrogen that it is a paying proposition to work the coal for the sulphate of ammonia.

In general, collieries require quite an appreciable amount of power, and all requirements in this respect could easily be met. Gas-fired boilers, large gas engines and gas turbines, have reached a high state of efficiency, and it might be possible in some cases to dispose of surplus gas to electrical companies, as in the case of the Old Silkstone Colliery Company, of Barnsley, selling coke oven gas to the Yorkshire Electric Power Company for boiler firing.

As suggested, the ideal combination is of low temperature carbonization with gas producers working under recovery conditions. Plants for low temperature carbonization have been before the public very much of late, and although very extravagant claims have been made on their behalf, some of the processes are now sufficiently well-developed to warrant their adoption on a commercial scale. Several plants are under erection at the present time, and very stringent guarantees have been given by the builders. For the gas producer portion several well tried processes of such nature are on the market, successful beyond question.

It might be interesting to consider what could be done with such a plant handling, say, 1,000 tons of coal per week. Next to a coking coal, the best coal for the purpose is one not absolutely non-coking, but that has sufficient of the coking property to form a soft coke. It should be fairly free from sulphur and should contain not more than 8 to 10 per cent. of ash. The type of retort heated by a portion of the gas evolved from the coal is perhaps the most suitable for the purpose. The gas would first be denuded of its tar and ammonia, and then washed in creosote oil to extract the benzol, and, if necessary, compressed to extract the whole of the light oils. The yields which might reasonably be expected from a typical Midland coal are as follows:

Coke	65–70 per cent.
Tar	6– 8 per cent.
Benzol and light oils	2– 4 gallons per ton.
Sulphate of ammonia	15–25 pounds per ton.
Surplus gas	1,000 2,000 cubic feet per ton.

The coke produced would be the smokeless fuel so frequently heard of nowadays. It would not, however, be much of an asset to colliery companies, as a market for it would have to be cultivated. It is very doubtful, too, if the fancy prices expected in some quarters would be realized.

The coke would, in the present proposal, be utilized in gas producers. On an average, it should yield from 60 to 90 lbs. of sulphate of ammonia per ton, and some tar; 650 to 700 tons of the coke would be available per week for gasification in producers; and, taking an average yield of 70 lbs. of sulphate of ammonia, there would be 45,500 to 49,000 lbs., or, say, 20 tons per week. It is hardly advisable to put down a producer plant with by-product recovery with a capacity of less than 500 tons per week; and, of course, the cost per ton gasified, both capital and maintenance, would decrease as the capacity of the plant was increased.

Roughly, 100,000 cubic feet of producer gas is obtained from a ton of fuel under recovery conditions, so that the weekly yield would be approximately, 65,000,000 cubic feet, of a calorific value of about 140 B.T.U. In producer gas practice none of this gas is actually necessary for working the plant, but steam is required, and the gas can be employed for boiler firing, and all the steam required obtained without extra fuel cost. It is advantageous to operate some portions of the machinery by electricity. For this purpose producer gas is best utilized in gas engines, and if there is any possibility of the sale of surplus power, large gas engine plants could be put down.

The scheme outlined is well within the bounds of possibility. There are already large producer plants in successful operation, and the tendency of colliery owners is in the direction suggested. There is a rapidly increasing demand for all the products obtainable from coal, and the prices realized leave a substantial margin of profit. Moreover, the market for all these products seems more than likely to go on increasing; and it is not reasonable to expect that their supply can continue to be limited by the demand for metallurgical coke.

Extinguishing Fires in Volatile Liquids.

At the last meeting of the American Society of Mechanical Engineers Mr. Edward A. Barber read an interesting paper on the subject named in the heading. Mr. Barber, having very properly remarked that the extinguishing of fires in oils and other volatile liquids has been a difficult problem, goes on to say: Fires of this kind are frequently disastrous. Water acts rather unsatisfactorily upon the majority of such fires, but recently two or three other materials introduced as extinguishers have shown some promise. Not all fires in volatile liquids are difficult to handle with water. When the liquid is miscible with water it can be successfully used; for example, denatured alcohol, wood alcohol, grain alcohol, acetone, etc. Where the liquid is not miscible with water little or no effect is produced except to wash the burning liquid out of the building, or, if the quantity of oil is small,

possibly to extinguish the fire by the cooling effect of a large quantity of water sprayed upon it. Soda and acid extinguishers are somewhat more effective than pure water, but even these fail under most conditions. The various grenades containing salt solutions, formerly extensively exploited, are of course practically worthless. The only principles that can be made use of in extinguishing fires in volatile oils are: (*a*),to form a blanket either of gas or solid material over the burning liquid, to exclude the oxygen of the air; or (*b*), to dilute the burning liquid with a non-inflammable extinguishing agent which is miscible with it.

Paradoxical as it may seem, ordinary sawdust is an excellent extinguishing agent for some volatile liquids, especially those of a viscous nature. The efficiency of the sawdust is due to its blanketing action in floating for a time upon the surface of the liquid and excluding the oxygen of the air. Its efficiency is greater on viscous liquids, since it floats more readily on them. The sawdust itself is not easily ignited, and when it does ignite it burns without flame, and the embers have not a sufficiently high temperature to re-ignite the liquid. The character of the sawdust, whether from soft wood or hard wood, appears of little importance, and the amount of moisture contained in it is apparently not a factor, so the drying out of sawdust when kept in manufacturing establishments for a time would not affect the efficiency. It was found that the admixture of sodium bicarbonate greatly increased the efficiency of the sawdust, shortening time and decreasing the amount of material necessary to extinguish the fires. A further advantage is it decreases the possible danger from the presence of sawdust in manufacturing plants, since it would be difficult, if not impossible, to ignite the mixture by a carelessly thrown match or any other ready source of ignition.

Although the efficiency of the sawdust is greatest on viscuous liquids such as lacquers, heavy oils, japan waxes, etc., in tests, fires were extinguished in gasoline in a small tank and also when spread upon the ground. In large tanks the sawdust or bicarbonate mixture does not work so well, since the sawdust sinks before the whole surface can be covered, and the exposed liquid re-ignites Carbon tetrachloride has received considerable attention as a fire-extinguishing agent, due largely to the activity of manufacturers of fire extinguishers using liquids of which it is the basis. This substance is a water-white liquid and has, when pure, a rather agreeable odor, somewhat similar to chloroform. Most of the commercial article upon the market, however, contains sulphur impurities which impart a disagreeable odor to the liquid. The substance is quite heavy (specific gravity 1.632), is non-inflammable, non-explosive, and readily miscible with oils, waxes, japan, etc. When mixed with inflammable liquids it renders them non-inflammable provided a sufficient quantity is added. Its vapor is heavy, the specific gravity being about 5½ times of air, consequently it settles very rapidly. As an extinguishing agent it operates both by diluting the inflammable liquid, making it less inflammable, and by forming a blanket of gas or vapor over the burning liquid which excludes the air. It has shown very satisfactory results under some conditions, but the readiness with which a fire can be extinguished with it depends to a considerable extent upon the skill of the operator and the nature of the fire. In tank fires the length of time that the liquid has been burning is an important fac tor, and where the sides of the tank become heated the only way the fire can be extinguished is to squirt the liquid forcibly at the sides.

The height of the liquid in the tank is also important. Where the liquid is low the sides form a pocket which retains the vapor and aids in smothering the blaze. When the tank is nearly full, however, it is very difficult, if not impossible, to extinguish a fire in a highly volatile liquid, such as gasoline; only the most skilled operators are successful in these cases. The size of the tank or the extent of the fire, if upon the floor, is, as would be expected, of considerable importance. In tanks larger than 28 inches by 12 inches more than one extinguisher working at a time is necessary to extinguish a fire in gasoline. In one test, on a tank 60 inches by 30 inches, 7 operators were necessary; even then it was only with the greatest difficulty the fire was put out.

These remarks apply to carbon tetrachloride in the one quart extinguisher as generally sold. Probably an extinguisher throwing a large stream would prove more efficient, but on account of the weight of carbon tetrachloride such an extinguisher would have to be mounted on a truck. Expelling the liquid by hand-pumping would probably be unsatisfactory, and it would be necessary to force it out in some other way.

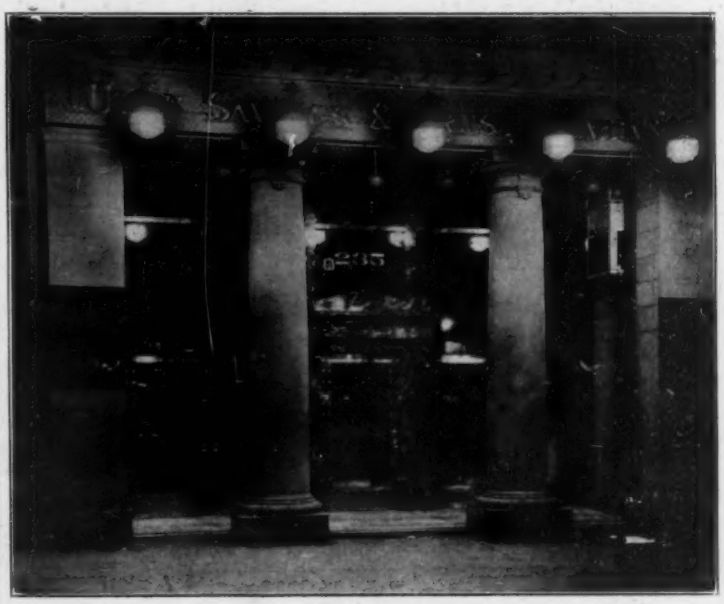
A few systems have been installed in which an elevated tank containing carbon tetrachloride is connected with automatic sprinklers or perforated pipes, in rooms where volatile and inflammable liquids are in use. So far none of them has as yet been called upon to extinguish a fire, but such a system should provide excellent protection in special cases. In such systems it would be necessary to consider the safety of the workmen and furnish ready means of escape, since carbon tetrachloride is an anesthetic, and where sprayed from an automatic sprinkler it would probably produce rapid results. The fumes, although of a very pungent nature, do not produce any permanent injury under ordinary conditions, but they are a distinct handicap in fighting a fire and are one of the objectionable features to carbon tetrachloride as a general fire extinguishing agent.

Another method of extinguishing fire in oils and volatile liquids which has recently been experimented with is that of using frothy mixtures. The idea seems promising, and the tests thus far reported indicate satisfactory results, but no experiments have been conducted in this country. The process consists essentially in causing two liquids to mix in a tank producing a foam. The tank is airtight, sufficiently strong to permit of the foam being forced out by carbon dioxide under pressure, and conveyed to the fire by means of hose. The exact nature of the liquids has not been disclosed, but one of them probably consists of a sodium carbonate solution containing froth-forming ingredients, such as glue or casein, and the other an alum solution. The two on coming together generate carbon dioxide which produces froth. This froth is reported to be quite stiff and to shrink in volume but little, even after half an hour.

A number of tests were conducted in 1912 in Germany; some of them on a considerable scale. In one case as much as 5 tons of crude naphtha in a tank were used, and in another an area of 1,300 square feet of burning tar. In all cases the results were reported satisfactory, the fires being extinguished in a short time. The frothy mixture undoubtedly owes its efficiency to its blanketing action upon the surface of the burning liquid excluding the air, and to the fact that the bubbles of liquid contain carbon dioxide which, upon bursting, produce an atmosphere in which combustion cannot take place. This process is still in an experimental stage, but from what has already been done, the idea seems a very promising one.

New Methods and Appliances.

An Example of Good Lighting.—One of the handsomest office buildings in Salt Lake City, Utah, is that which houses the office workers of one of Utah's largest and soundest financial institutions, the Utah Savings and Trust Company, the solidity of which concern is like unto that of the New York institution popularly known as the Seaman's Bank. The picture shows clearly the main entrance to the



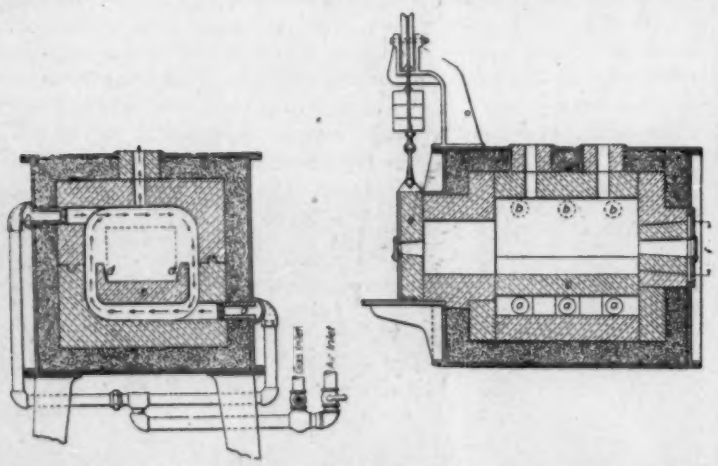
structure. Of course, there was much competition over the contract to light this exterior, and to Mr. John C. D. Clark, the clever Manager of the Utah Gas and Coke Company, came the task of convincing the financial men that gas was the proper agent with which to have the lighting done as it should be done. The illustration shows how satisfactory and well he redeemed his pledges. This lighting is maintained, we believe, until midnight, from sunset, of each 24 hours.

COKELESS GASIFICATION OF COAL BY STRACHE'S PROCESS.—In the journal of the Austro-Hungarian Gas Association Herr Th. Grothe, after mentioning the necessity for a solution of the dust and smoke nuisance and the value of gas fires, describes Professor Strache's proposals. The coal is completely gasified in a producer like a blast furnace; instead of carbonizing coal, and then using the coke to make water gas, with corresponding loss of heat units. The coal at the top is first distilled by the heat from the producer gas obtained during the blowing up, applied externally; the coke formed falling direct into the producer. The gas coming off from the coal at the top is removed without becoming mixed with gases from the producer. When the producer is heated up sufficiently steam is admitted, and the water gas formed goes through the coal at the top, which thereby has its carbonization completed. The period of distillation is reduced to 2 or 2½ hours. The heating value of the gas obtained is 366 to 382 B.T.U. per cubic foot; the yield 53,000 to 56,000 cubic feet per ton; and the B.T.U. in the gas from 75 to 80 per cent. of the heating value of the coal. Herr Grothe thinks this opens out many new possibilities, a cheaper gas, widely useful.

He mentioned a health resort which was determined to do away with the smoke nuisance, arising from the daily consumption of 300 tons of coal, that decided to put up a Strache plant, at a cost of $1,500,000. The price at which gas was to be sold was 34 cents per 1,000 cubic feet, at which figure a sale of 1,263,000,000 cubic feet per annum would pay 15½ per cent., after allowing for depreciation.

It is a pity, Herr Grothe thinks, that the gas industry has taken so little interest in Professor Strache's proposals. There is nothing in the objection that the gas is poorer than coal gas, for the actual heating value of the air-and-gas mixture which is burned is in all cases about 86 B.T.U. per cubic foot, except with blast furnace gases, in which case it is 57.4. Flameless combustion leads to similar results, the temperature being always from 1,500° to 2,000° C., and the efficiency about 95 per cent.

NEW GAS FURNACE.—A new line of gas furnaces for heat treatment of high speed steel has been brought out by the Industrial Furnace Company. The furnaces have greater burner capacity than those for ordinary tool steel, and heavy linings to resist the intense heat and give extra insulation. The furnace shown is designed for hardening



milling cutters, dies and tools that must be laid on a flat surface while treated. The fire brick lining is 3-inch thick with 2½-inches asbestos outside. Two sets of burners are used, one set, *a*, under the hearth, and the other burners, *b*, on the opposite side along the dome. By this arrangement the hearth, *c*, is enveloped in a rotating flame, which gives an even heat with perfect combustion of fuel. The edges of the hearth are protected by ledges, *dd*, so that the flame does not touch the steel. It is stated that the smaller sizes will heat to 2,200° F. in 15 minutes and the larger sizes in 30 minutes. There is one inlet and a single control valve for both gas and air. The heating chamber ranges from 10 to 30 inches in depth and 6 to 16 inches in width, and the door opening from 5 x 6 inches to 10 x 16 inches. A firebrick plug, *f*, can be removed to replace the hearth, the opening in the plug being for the insertion of a pyrometer, and there is a sight hole in the door. Another furnace is made with a cylindrical heating chamber and case, designed for hardening drills and reamers. This type has sliding doors that when closed leave a circular opening in the center, through which tools may be placed in the heating space. It has a heating chamber 7 inches in diameter and 10 inches deep.

Items of Interest
FROM VARIOUS LOCALITIES.

A PARTY of inspection from the La Crosse (Wis.) Gas & Elec. Co., recently visited the plant of the Winona (Minn.) Gas Light and Coke Company, and, under the guidance of Manager W. F. Clausen, went over the premises in thorough way. The party also visited several local industrial establishments that use gas in many and differing ways, thanks to the persistency of Mr. Clausen. The La Crorse visitors included Messrs. Thurston Owens, Manager; A.W. Higgins, General Superintendent; F. H. Evans, Manager, the coal division; J. McKinley, Industrial Supervisor; and J. B. Parsons, Assistant to Mr. Higgins.

AT the annual meeting, the Newport (R. I.) Gas Company, these officers were elected: Directors, Thos. A. Lawton, Wm. R. Hunter, Andrew K. Quinn, Henry Anthony and Parker Braman; President, A. K. Quinn; Secretary, T. A. Lawton. The Company enjoyed a very prosperous year, and its clever, far-seeing President-Engineer (Mr. Quinn) has been for some time planning a goodly extension to the Company's coal gas apparatus.

THE California State Railroad Commission has ordered the proprietors of the Ontario-Uplands (Cal.) Gas Company to put its selling rate, "in the district within the city of Ontario," at $1.25 per 1,000 cubic feet. The prevailing figure is $1.75, less 25 cents per 1,000 for prompt payment. The Company may charge a minimum rate not to exceed 50 cents per meter per month. The Commission, in making this adjustment, declares: "This rate will be sufficient to provide, on a very liberal basis, for all operating expenses, in addition to allowing 3 per cent. for depreciation and 8 per cent. interest on the book value of the physical property, as contended for by the defendant, or a total allowance of over 11.7 per cent. on the reproduction value of operative physical property, as estimated by the Railroad Commission's engineering department." In this latter connection it may be remarked that the book value returned by the Company amounted to $68,259.93; the engineering division of the Railroad Commission estimated the value at $64,931; and the engineering division proper of the State put the value at $54,712.

THE mid-January meeting of the Brockton (Mass.) Gas Light Company's Employees' Association was held in the new headquarters in the Mason Block, which are well-equipped for every purpose of the Association. The furnishing was done at the joint expense of the Company and the Association; the rent payment is also arranged on like basis. Mr. James P. Moran presided, and the "talk" of the evening was by Mr. G. E. Harris, of the Rathbone-Sard Company. The resignation of Mr. Wilfred Littlefield as Secretary was accepted, and Mr. Hector Mongrau was elected to succeed him. President Moran appointed as House Committee Messrs. Moran, Fitzmaurice, Donnell, Sheehan, Laroque, Wise and Mooney.

CERTAIN residents of Attleboro, Mass., have filed a petition with the Board of Health protesting against the construction of a gas plant (at an estimated cost of $250,000) on Wall street, in fact to replace its existing plant. The main objection (although, of course, that of "nuisance" it may be taken for granted was not overlooked) was that the operations of the plant constituted a menace to health.

FOR the 24 hours ended at 6 A.M., January 14th, the output of the Boston (Mass.) Consolidated Gas Company amounted to 26,055,000 cubic feet, which is a record-breaker in the accounts of the Company.

ALDERMAN RETTER, of the Hartford (Conn.) Board, has fathered a resolution which instructs the ordinance committee to amend the ordinance, concerning the duties of the sealer of weights and measures, to include therein the testing of all gas and electric meters prior to the installing thereof; further, that the committee give a public hearing on the advisability of creating a separate division, to be concerned in the testing of such meters, the division to be under the control of a qualified person.

AT the annual meeting of the Lincoln (Neb.) Gas and Electric Company, these officers were chosen: Directors, H. L. Doherty (Chairman), F. W. Frueauf, H. Honeywell, W. H. Raymond, L. E. Wetling, E. B. Stephenson, S. H. Burnham, R. M. Joyce and G. A. Mont-

gomery. President, F. W. Frueauf; Vice-President and General Superintendent, G. A. Montgomery; Secretary, R. E. Phillips; Manager, Commercial Division, J. E. Schuff. The only change is the naming of Mr. Montgomery to succeed Mr. B. C. Adams, who joined the forces of the Seattle (Wash.) Company, early in 1913.

S. WALDO COLEMAN, as counsel for J. E. Rogers, has applied to State Railroad Commissioner Thelen, for the issuance of a certificate of public necessity and convenience in the matter of operating a gas plant in Martinez, Cal., and in other adjacent sections of Contra Costa county.

L. V. BRUCE is informed that, the first inst., the title of the Galva (Ills.) Gas Company became that of the Consolidated Light and Power Company, Galva Branch. This Company operates in the districts of Buda, Galva, Kewanee and Sheffield.

ELSEWHERE we illustrate something that has been done by Mr. John C. D. Clark, Manager, the Utah Gas and Coke Company, Salt Lake City, in lighting by gas the porches and entrances to one of Salt Lake's largest and soundest financial institutions. And another instance of the good work that his Company is doing is shown in the window displays that are being made. Several of these have been tried out, and perhaps the most attractive one represented a parlor or sitting room, carrying an ornamental mantel piece. The general furnishings included a handsome rug, of fine coloring and design, a library table on which rested a portable gas lamp, and a couple of easy chairs, on the back of one of the latter a smoking-jacket was spread, and an open book held the center of the table. Some time following the placing of the exhibit, a little gray tabby, who usually made her home in the shop, evidently thought to help out the advertising scheme. The window scene was occasionally varied, sometimes by seating a big doll in a little red chair, placed directly in front of the grate, and at her right was a dog of *papier maiche* construction. The vacant chair to the other side of the window had a cushioned seat, and, on the spur-of-the-moment, an employee placed the cat on the cushion. So well did she like the arrangement that every subsequent afternoon found her enjoying a nap on it. Later on the cushion was placed on the floor just beside the dog, and the cat, there outstretched, gave unmistakable evidence of the comfort derived from the warmth of the fire in the grate. During the period of slumber, throngs gathered every evening to witness the odd display.

THE Peoples Fuel Gas Company, to manufacture and distribute artificial gas in Crown Point, Ind., has been incorporated by Messrs. H. P. Broughton, Luella C. Tinkham, Jane T. Broughton, Martin J. Smith, and Chas. J. Tinkham. The initial capitalization of the concern is $25,000.

"L.," WRITING under date of the 16th inst., says: "Having secured a private right-of-way in Holland, Mich., for a high pressure main, the interests identified with the American Public Utilities Company, of which the Holland City Gas Company is a subsidiary, are pushing the construction of the high pressure system through the township of Holland to the City of Zealand, an enterprising community on the Grand Rapids, Holland and Chicago Interburban line. The severe cold weather caused a temporary suspension of the work; but, as soon as the frost is out of the ground, the line will be completed to the east of Zealand, which community will likely be having gas service by April 1st. The main line from the plant of the Holland City Gas Company to the east end of Zealand is about 5 miles, and, by the time the pipes are laid, compressor and compression tanks will have been installed. An office is to be opened in Zealand, and it is anticipated that, during the first year, between 300 and 400 consumers in Zealand, and in the township between that city and Holland, about 400 will be supplied, with the prospects of 600 by the end of the second year."

MR. PALMER YORK informs us that the Tenney Service Association, consisting of the various public utility companies, under the general management of Charles H. Tenney and Company, appointed a committee to devise plans for minimizing the number of preventable accidents to employees in handling the work of these Companies. Inasmuch as the "Safety, first" movement is so widely spread throughout the country at the present time, the Tenney folks will be pleased to hear from any other companies interested in the work, and the Tenney Association will freely and willingly exchange ideas and suggestions of and for mutual benefit.

JUDGE SULLIVAN, in the Supreme Court, Cook County, Ills., recently issued a temporary injunction restraining the authorities of Oak Park from enforcing the 80-cent gas rate recently declared by them. Under its franchise the Company has the right to charge $1.10. The injunction was asked for by Judge N. C. Spear, who argued lack of authority on the part of the village officials, under the "Towns and Villages Act" to regulate rates that may be charged for public commodities. In all likelihood the case will eventually be relegated to the Public Utilities Commission for decision.

WE are indebted to the attention of Mr. Paul Leake, of the American Public Utilities Company for this graphic statement respecting the earning of its subsidiaries during November, 1913: Gross, from operation, $230,352, an increase of $17,896 as of November, 1912, or 8.42 per cent.; net, $114,681, or plus $891. For the 12 months ended November 30 the gross was $2,249,707, and the net was $996,420; or a balance of $217,637, all interest charges and a dividend on the preferred being accounted for.

AT the regular January meeting of the Woonsocket (R. I.) Gas and Electric Employees Club, Vice-President Ralph W. Perkins was in the Chair, owing to the continued severe illness of President Joseph Pratt. Resolutions of sympathy were adopted over his illness. The main thing for the evening was a lecture by Mr. R. H. Madeina (Independence Inspection Bureau of Philadelphia), whose subject was "Accident Dangers and their Prevention." The lecture, which was coherently put together and interestingly narrated, was amply illustrated by slides, which were very deftly handled by Mr. Edwin P. Crocker. At the conclusion of his lecture Mr. Madeina was formally thanked, and when the discussion (which was quite general) was closed the members enjoyed the hospitalities of the House Committee.

THE Iowa Falls (Ia.) Gas Company's properties will be sold at sheriff's sale, the afternoon of Friday next. The Receiver (Mr. George S. Forest) reports a total indebtedness of $34,000, the Oregon Colonization Company being the principal creditor.

DURING the year the average (40 inspections) candle value of the gas supplied by the Wilmington (Del.) Company was 20.67. The total number of plumbing and gas piping inspections for the year was 4,802; and of these 34 plumbing jobs were reported on adversely. The number of defective gas piping instances was 13.

AT the annual meeting of the Eastern Monroe (Y. Y.) Electric Light and Gas Company the following Directors were elected: Horace E. Andrews, John Carstensen, Walter N. Kernan and W. K. Vanderbilt.

MR. R. N. ZEEK, who has been overhauling the plant of the Pensaeola (Fla.) Gas Company, has returned to the home headquarters of the U. G. I. Company.

MR. R. A. ZEIGLER, Manager, the Central Indiana Gas Company, Madison County, Ind., has appointed Mr. H. W. Thornburg (of Muncie) to the position of head accountant, in the local office at Anderson, Ind.

"B. R. B.," writing from Long Beach, Cal., under date of the 13th inst., incloses this: "I thought you might like some detail of a stag party recently held in this sandy spot. If it doesn't suit, kill it. Here it is: All the better workers for an evening of relaxation, the men of his department can have none other than pleasing recollections of the banquet tendered them in the Palace Cafe by Chief W. H. Partridge, of the Long Beach Consolidated Gas Company. His guests numbered a score-and four, and surely a jolly party it was. A unique gavel was presented to the Manager; and I say it was unique in that it was made up entirely of gas fittings, silver plated. The presentation speech was delivered by L. B. Barker, and Manager Partridge's response was a witty one. Amongst other speakers were that prince of Managers, F. A. Green and Mr. F. A. Pushee. We also had some music by a home-product quartette; and the members of the Mandolin and Guitar Club assisted most melodiously. Mr. Partridge has been with the Company since 1904, during which period its expanding business has kept pace with the city's growth; and many of those at the feast have been with Company 8 years. As an agreeable, get-together affair, the banquet was voted a complete success by those who shared in it."

The Market FOR GAS SECURITIES.

The improvement in local gas shares continues, Consolidated showing a gain of 2½ points in the week. The opening quotations for it this morning (Friday) were returned at 134¾ to 135. There was positive evidence of activity in the shares on the Exchange, over 3,000 shares having been dealt in, with a moderate gain each day. We have record of sales of $11,000 N. Y. Gas, Electric Light, Heat and Power Company, 5's, at an average of $102¾. The annual meeting of the Company will be held at noon of Monday. The earnings of the entire system have been satisfactory for the past year, although it is said that the earnings of the Consolidated Gas and the Astoria Light, Heat and Power Company's are but 4.10 per cent. against 4.65 for the preceding year. The meeting of the Trustees will be held the 29th. The record output for 24 hours was made the 13th, when the system sent out 125 millions cubic feet.

Brooklyn Union also maintains its gain, the current rating (125½ to 128) being 1½ points over the bid of last week. The gain in output of some of its branches being little short of wonderful, this being especially so of the district between East New York and Queens. A sale of B.U.G. 5's at 103 is reported.

There was some active trading in out-of-town shares, with especial activity in Peoples, of Chicago, although the net trading as of today leaves the stock at the figures quoted last week—124 to 124½. We note sales of $3,000 Consumers', 5's, Chicago, at par; $3,000 Chicago gas 5's, at 101 to 101½; and $23,000 Peoples refunding 5's, at 99¾ to 100.

Massachusetts gas securities are up a point or so. The Boston Consolidated Gas Company reports a record output for the 13th, when consumers took 22,485,000 cubic feet, a gain of 6.7 per cent. over the previous high. As that day was a particularly bright one, of course the gain is largely to be credited to fuel use, the temperature in Boston marking close to 7° below.

The general gas share market is better all-around, although Lacledes (both common and preferred) continue to look abnormally under value. Messrs. A. B. Leach & Co., and Kean, Taylor & Co., report the purchase of an issue of $500,000 Utica, N. Y., refunding 50-year 5's, at a satisfactory figure. Washington (D. C.) gas sold at 442, and some $5,000 of its bonds (5's) were traded in at 106¾. The Company's regular quarterly of $1.20 per share is payable the 2d prox.—par is $20. The Coast Counties (Cal.) Gas and Electric Company has been granted authority to issue $150,000 in 6 per cent., 10-year debenture incomes, callable at any time, on 6 months' notice, at 101 and interest. The bond market in general continues very active at advancing quotations.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

JANUARY 26.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$99,816,500	100	134¾	135
Central Union Gas Co.—				
1st 5's, due 1927, J. & J.	3,500,000	1,000	101	103
Mutual Gas Co.	3,500,000	100	157	157
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	99	101
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	59	63
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98¼	100¼
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	96	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	100	102
The Brooklyn Union	15,000,000	1,000	125½	128
1st Con. 5's, due 1948, M. & N.	15,000,000	—	102	103
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	133	136
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	509,000	1,000	97	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47¾	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Chicago Gas Co. Guaranteed Gold Bonds	7,000,000	1,000	104	106¼
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	94	96
Bonds	75,000	—	—	100
Cincinnati Gas and Electric Co.	29,500,000	100	67	69
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus Gas Light & Fuel Company	1,682,750	100	65¾	66¼
Preferred	3,026,500	100	33	35¼
Consolidated, Baltimore	13,460,084		118¾	119
Mortgages, 5's	3,400,000		—	—
General Mortgage 4½	10,661,000		—	—
Con. Gas Co., Baltimore City, 4½	2,751,000		—	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,380,000	1,000	100	101
Hartford	750,000	25	190	200
Laclede Gas Co., St. Louis.	10,000,000	100	97¾	100
Preferred	2,500,000	100	—	102¾
Bonds	10,000,000	1,000	102¾	103
Madison Gas and Electric Co. " 1st Mtg. 6's	400,000	1,000	106	
Massachusetts Gas Companies, of Boston	25,000,000	100	92¾	93
Preferred	25,000,000	100	92	92½
Montreal L. H. & P., Canada	2,000,000	100	219¾	220
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	124	124¾
1st Mortgage	20,100,000	1,000	103	103½
2d "	2,500,000	1,000	104	—
Pacific Gas and Electric Co.	15,500,000	—	39	41
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	105
Extension, 6's	600,000	1,000	113¾	115
General Mortgage, 5's	3,447,000	1,000	94	96
United Gas Imp. Co.	55,502,960	50	84¾	85
Washington (D. C.) Gas Co.	1,500,000	200	440	442

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

Alabama Light and Traction Company.—Annual meeting, May ——1914. Officers, President, R. L. Ellis, Selma; Treasurer and Secretary, H. O. Hanson, Mobile.

American Gas Institute.—Annual meeting, New York, October 21, 23, 1914. Officers: President, W. H. Gartley, Philadelphia. Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting————1914. Officers: President, A. A. Dion, Ottawa; Secretary and Treasurer, John Keilior, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, New York City, Oct. 1914. Officers: President, J. T. Hntchings, Bochester, N. Y.; Secretary, C. H. B Chapin, 29 W. 39th street, New York City.

Gas Meters.—Monthly Section Meetings; Grand Commissioner, Will. W. Barnes, East Orange, N. J.; Gen'l Sec'y, H. Thurston Owens, La Crosse, Wis.; New York Section, Chairman, W. H. Pettes; Secretary, G. E. Smith, Sipp Avenue, Jersey City, N. J. Philadelphia Section; Chairman, Stanley Grady; Secretary, H. E. Stiteler, Broad and Arch streets. Cleveland Section, Chairman, F. B. Hutchinson; Secretary, Wm. Holtz, East Ohio Gas Co. New England Section, Chairman, T. W. Jennings, Boston; Sec., F. K. Wells, 69 Broad street, Boston. Winona Section, Winona, Minn., W. F. Clausen, Chairman. Bethlehem Section, Trueman Weithnecht, Chairman; Sec.-Treas., Truman Buss. South Bethlehem, Pa. Wisconsin Section, C. H. Wiggers, Chairman; A. A. Ott. Secretary, Milwaukee, Wis.

Guild of Gas Managers of New England.—Annual meeting, March, 1914. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, March 18th and 19th, 1914. Chicago, Ills. Officers: President, W. F. Barrett, Chicago, Ills.; Secretary-Treasurer, Horace H. Clark, 115 No. Oak Park avenue, Oak Park, Ills.

Illuminating Engineering Society.—Annual meeting, Cleveland, O., September, 1914. Meetings of Sections, monthly. Pres., Charles O. Bond; General Secretary, J. D. Israel, 1000 Chestnut st., Philadelphia, Pa. Sections: New York, Secretary, C. L. Law, 124 West 42d street. New England, Secretary, C. M. Cole, 146 Pearl street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Counties Gas & Elec. Co., Ardmore, Pa Secretary, J. B. Jackson, 28 North Market street. Pittsburgh, Secretary, Alan Bright, 927 Wabash Bldg., Pittsburgh, Pa.

Indiana Gas Association.—Annual meeting, March 11 and 12, 1914. Terre Haute. Officers: President, A. S. Cooke, Terre Haute; Vice-President, A. C. Blinn, Evansville; Secretary-Treasurer, Philmer Eves, Indianapolis.

Institution of Gas Engineers.—Annual Meeting, Liverpool, England, June 16. President, Edward Allen; Secretary, W. T. Dunn.

Iowa District Gas Association.—Annual meeting, Davenport, May 27, 28, 29, 1914 Officers: President, B. C. Adams, Lincoln, Neb.; Secretary, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, October—— 1914, Arkansas City. Officers: President, Al. Newman, Arkansas City; Secretary and Treasurer, Ivan Thomas, Wichita Kas.

Michigan Gas Association.—Annual meeting, September, 1914. Place, undetermined. Officers: President, H. W. Douglas, Ann Arbor, Mich; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1914. Mexico, Mo. Officers: President, P. A. Bertrand, Joplin, Mo.; Secretary and Treasurer, P. W. Markham, Brookfield, Mo.

National Commercial Gas Association.—Annual meeting, Dec. ——1914, Minneapolis, Minn. Officers: President, P. S. Young, Newark, N. J.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, St. Louis, Mo., May 19 and 20, 1914: Officers: President, E. L. Brundrett, Kansas City, Mo.; Secy-Treas., T. Clive Jones, Delaware, O.

New England Gas Association.—Annual meeting, February, 18th and 19th, 1914. Boston Officers: President, T. H. Hintze, Providence, R. I.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—Next Meeting, —— ——, 1914, Asbury Park N.J. President, C. F. Butcher, Freehold, N. J.; Sec'y-Treasurer, O. F. Potter, Newark, N.J.

Ohio Gas Association.—Annual meeting, February ——— 1914 Columbus, O.; President, John M. Garard, Columbus, O.; Secretary, L. B. Denning, Columbus, O.

Oklahoma Gas, Electric and Railway Association.—Annual meeting, Oklahoma City, May, ——1914. President, F. E. Bowman, Ada; Secretary-Treasurer, H. V. Boze, Oklahoma City.

Pacific Coast Gas Association.—Annual meeting, Long Beach, Cal., September ——— 1914. Officers: President, C. S Vance, Los Angeles, Cal.; Secretary-Treasurer, Henry Bostwick, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, Allentown, Pa., April ———, 1914; Officers, President, J. A. Frick, Allentown, Pa.; secretary-Treasurer, W. O. Lamson, Jr., West Chester, Pa.

Society of Gas Lighting.—Annual meeting Dec., 11, 1913: monthly meetings, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 29 West 39th street, New York city.

Southern Gas Association.—Annual meeting, Mobile, Ala., April 22, 23, 24, 1914, Officers: President, James Ferrier, Rome, Ga.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting, May 22, 23 and 24, 1914, Galveston, Tex. Officers: President, G. H. Gifford, Fort Worth Tex.; Secretary-Treas., J. D. Walker, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 20, 21, 22, 23, 1914, Milwaukee, Wis. Officers: President, Ewald Haase, Milwaukee, Wis.; Secretary-Treasurer, Henry Harman, Milwaukee, Wis.